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The National Civic Federation and Conciliation in Labor Troubles.

What we believe is one of the most hopeful and encouraging features of the present industrial situation is in the fact that so many of the most prominent representatives of organized labor and of organized or associated capital should meet as they did in New York last week to confer together as to ways and means of avoiding friction—strikes, lockouts, etc. A public meeting was held in the Chamber of Commerce on the 7th. Samuel Gompers, president of the American Federation of Labor, presided, and the speakers were Bishop Potter, John Mitchell, president of the United Mine Workers' Association of America; Charles R. Flint, president of the United States Rubber Company; Daniel J. Keefe, president of the International Association of Longshoremen; William H. Sayward, secretary of the National Association of Builders; James O'Connell, president of the International Association of Machinists, and Herman Justi, commissioner of the Illinois Coal Operators' Association.

Among those present were Chauncey H. Castle, president of the Stove Founders' National Defense Asociation; W. J. Chalmers, National Metal Trades Association; John H. Flagler, director of the National Bank of North America; G. Watson French, vice-president of the Republic Iron and Steel Company; Henry W. Hoyt, president of the National Founders' Association; E. T. Jeffrey, president of the Denver & Rio Grande Railroad; Walter L. Pierce, president of the National Metal Trades Association, and Adolphus C. Bartlett, vice-president of Hibbard Spencer, Bartlett & Co., of Chicago. Cardinal Gibbons and Abram S. Hewitt sent letters of regret.

The meeting was held under the auspices of the National Civic Federation's Conciliation Committee which was in session during the week. The prevailing note seemed to be that the time had about come when neither side could deny the right of the other to organize for joint action and that there had been enough of "showing of strength." There was no evidence that any member of the conference had what he considered a panacea for all industrial ills, but it was evident that practically all believed thoroughly in the great advantage of getting together and discussing things in reason rather than in attempting to fight them out. This we consider to be a great gain in itself.

When both sides to a dispute are honest, and where they both have important interests that will inevitably be injured by a contest it is usually entirely practicable to come to an agreement at least fairly satisfactory to both sides. But when one side "refuses to recognize" the other, ignores all requests for a conference and takes the high and mighty ground that the others have no right to even discuss or propose associated action there is sure to be trouble, as has been proven over and over again. It has been demonstrated by actual experience, especially by that of the National Stove Founders' Defense Association, whose work we have before referred to, that organizations of employers on the one side and of employees on the other can come to an agreement which amounts practically to co-operation for the welfare of both sides and which almost, if not quite, prevents the possibility of a strike or a lockout. If this thing can be done by stove makers and the molders employed by them it can be done in other trades, and the sooner everybody interested recognizes this fact and does what he can to bring about such a condition in his own trade or business the better it will be in the end. No such agreement can be reached, however, so long as there are considerable numbers that "refuse to recognize" the organization on the other side. The successful working of the plan depends primarily upon the fullest recognition by each side of the organization on the other and its right to do business through agents or delegates of its choosing. It is vain to regret that organizations have been formed among those workmen who construct machinery. The organizations are here and it is in our opinion folly to expect to see them disappear or to expect that any power can crush them out of existence. A much better plan is to meet organization with organization, not in battle array, except as a last resort, but upon business principles. Agreements must be made and it must be certain that such agreements are so drawn as to be capable of only one reasonable interpretation and that both sides thoroughly understand the meaning of them. The agreements must be for a definite period of time and both sides must, when such agreements are made, live up to them strictly. This last is especially important, and the men especially, we believe, need to arrive at a better understanding of its importance. Even a bad bargain must be adhered to rather than destroy one's credit by violating a deliberately made agreement. Man's reason was given to him to be used, and it is folly to fight until reason has first been appealed to. Are unreasonable demands made? then let the unreasonableness of them be shown, and only when there is no other way let the fighting begin. A few fights, made necessary by utterly unreasonable demands stubbornly adhered to will teach wisdom and moderation to those unable to learn them in any other way, but industrial fights teach little or nothing to either side when fought under a misunderstanding or without a full and complete knowledge by each of the fighters as to the position held by the other and the reasons for it.

The Latest Pistol.

On another page of this issue we give an illustrated account of an automatic pistol called the Luger, which is really the later improved form of the Borchardt pistol which we gave an account of in our issue of February 14, 1895. The performance of this Luger pistol is remarkable, as shown by tests of army boards. Twenty-four shots were fired from it at the rate of 116 a minute. This included the time of removing two empty magazines and inserting two loaded ones, so that the rate of firing one magazine charge, or eight shots, must of course be considerably faster. In the accuracy test the mean devia-

tion of the shots was shown to be only slightly more than 0.5 inch at a range of 75 feet. It was dismounted, *i. e.*, taken apart as shown in our illustration, in 3¾ seconds and reassembled in 12½ seconds.

It also stood the remarkably severe dust and rust tests very well and gave every evidence of being the very best military pistol presented before the trial board. After being immersed in a solution of sal-ammoniac and allowed to remain until thoroughly rusted, it was without cleaning fired as a single breech-loader, and after being simply oiled, without disassembling worked automatically as before. It is thought probable that the United States Army authorities will adopt it for army use, in which case it will be manufactured here.

Child Labor in Georgia.

An instance in which the individual or immediate interests of employers and employees are at variance with their interests as citizens and with their ultimate personal interests, is found in the failure of the Georgia Legislature to pass at its session last winter legislation intended to restrict the employment of children in the mills of the State. The building of cotton mills has led to the employment of a great many children and these are employed much below the age at which the law allows them to be employed in New England or elsewhere where people have become enlightened regarding these matters. It is stated that women of the State have taken hold of the matter and have initiated a campaign intended to educate public sentiment. They point out specially that the net result of the present situation is that the white children are placed at a disadvantage with respect to the colored ones, because the colored children are excluded from the cotton mills and therefore are allowed to go to school, whereas the children of the poorer white people, not being excluded from the mills, are permitted to work for very long hours and are thus entirely deprived of any opportunity for an education. The situation is one which certainly demands a remedy, and we hope that an effective one will be found and soon applied.

The Bread Winners.

The oft-recurring question of the authorship of the story published in the "Century Magazine" a good many years ago and entitled "The Bread Winners" is again under discussion, and this time it is attributed to a Miss Ida Harris, of Champaign, Ill., who is said to be the daughter of the President of the First National Bank of that place. We do not know whether this is true or not. It was generally agreed at the time that the story was an outrageous slander upon the working people of the country, though since its appearance a number of stories have been published by the "Century" that have been equally objectionable and as certainly productive of misunderstanding and harm—stories that are manifestly written by those who have no accurate acquaintance with the labor situation, with the relations actually existing between employers and employees, nor with the kind of people that go to make up the great body of American workingmen.

Some Combinations.

The formation of combinations goes merrily on, among the ones announced lately being a $50,000,000 locomotive trust, which it is said will include the following works:

The Brooks Locomotive Works, of Dunkirk, N. Y.; the Cooke Locomotive Works, of Paterson, N. J.; the Manchester Locomotive Works, of Manchester, N. H.; the Pittsburgh Locomotive Works, of Pittsburgh, Pa.; the Rhode Island Locomotive Works, of Providence, R. I.; the Schenectady Locomotive Works, of Schenectady, N. Y.; the Richmond Locomotive Works, of Richmond, Va. It is said that this combination will control at least two-thirds of the capacity of the entire output of the country.

There is also a shipbuilding organization which it is said will have a combined capitalization of $65,000,000 and will control works having a combined capacity of 380,000 tons of shipping per annum and will employ 24,000 men. The plants included in this deal are given as follows: lows:

Newport News Shipbuilding and Dry-Dock Company, Newport News, Va.; Union Iron Works, San Francisco, Cal.; Bath Iron Works (Limited) and Hyde Windlass Company, Bath, Me.; Crescent Shipyard and Samuel L. Morse & Sons Company, Elizabethport, N. J.; the Canda Manufacturing Company, property consisting of one thousand acres of land fronting on Arthur Kill, with extensive factory buildings, Carteret, N. J.

It is claimed—with how much truth we do not know—that this shipbuilding organization had been held in abeyance for some time pending the hoped-for passage of the Ship Subsidy Bill, it being pointed out that had this bill been passed it would have formed no inconsiderable portion of the assets which the shipbuilding concerns could have listed as an attraction for investors in stock of the combination. The formation of the organization at this time is taken as evidence that hope of the passage of the Ship Subsidy Bill has been definitely given up.

The following item we find in the columns of an esteemed contemporary: "It is surprising to be told that compressed air under a pressure of 100 pounds per square inch will leak through a 1-16 inch hole at the rate of a horse-power every five minutes, or 12 horse-power per hour. Mr. W. P. Pressinger made this statement before the New York Railroad Club recently, in order to emphasize the importance of tight piping and reservoirs." The statement is certainly surprising. Mr. Pressinger's words, as reported, were: "Compressed air under 100 pounds pressure will leak a horse-power through a 1-16 inch hole in five minutes," and the maker of the above paragraph, it will be seen, extended the statement in the same direction. The simple fact is that air at 100 pounds gage pressure will leak through a 1-16 inch hole at a rate of over 6 cubic feet of free air per minute, and it takes one-fifth of a horse-power to compress this volume of free air per minute to a pressure of 100 pounds. The extension of the time to five minutes or to an hour of course would not change the horse-power, as the time had nothing to do with it, and one-fifth of a horse-power would be continually required to make up the loss as long as the leak continued, whether this was for five minutes or five months.

Charles M. Schwab on Combinations, Tariffs and other Matter of Interest.

Charles M. Schwab, president of the United States Steel Corporation, gave his testimony before the Industrial Commission at Washington on the 11th inst., and said some very significant and interesting things that should be carefully considered by everybody interested in industrial matters. For the present we simply give the press report of his testimony and shall comment upon some points of it later.

He said that the United States Company controls eight companies by owning their stocks, and that while steps are taken to insure the good-will and the co-operation of all these companies, each one is left to conduct business in its own way. As a rule the plan had been to take in only companies which were not competitors, but it was true that there were cases in which two institutions of the same line were brought together, and in such cases the managers were expected to confer in making their plans for sales.

Enumerating the advantages of consolidation, Mr. Schwab said they were found especially in transportation and management and in the utilization of all the ores owned. In this connection Mr. Schwab said that the United States Company owns 80 per cent. of the iron ore of the Northwest, and he expressed the opinion that these ore deposits must constantly grow in value because limited. The company makes from 65 to 75 per cent. of the steel products of the country. He also said that there had been no increase in the price of products since the organization of the United States Company, and that the tendency is toward lower prices.

Asked in detail for the plan of management of the various companies combined in the steel company, Mr. Schwab said it is the purpose of the parent company to keep the subsidiary organizations in harmony, and that this is to be done by indicating the officers of the various concerns.

"There may not be so many names of influence on the boards," he said, "but the management will be efficient." Mr. Schwab excused himself once or twice from speaking concerning the details of the organization of the company, saying that questions concerning capitalization, premiums, etc., should be asked of Mr. Morgan.

"I don't know the steel trust," he said, when someone so indicated his company. In a general way he would say that the company is organized upon the same plan as the Federal Steel Company, but he did not consider the company over-capitalized.

He said the assets of each of the subsidiary companies had increased in value since their organization, and that the popular estimate did not place a high enough value upon the mines owned by the company. He also stated in this connection that the company owns 60,000 acres of Connellsville coking coal land, and that in its iron mines there are 500,000,000 tons of ore in sight. He thought a reasonable profit on this iron ore would be $2 a ton. Asked how long he thought these mines would be able to meet the demand, Mr. Schwab placed the limit on the iron ore at thirty years and on the coal at sixty. Each of the constituent companies, he said, makes its own purchases and its own sales.

"In other words," he said, "the United States Steel Corporation is a clearing house to which its constituent companies go for information." He admitted that the company sells many of its products at a lower price in foreign markets than at home, saying that this practice is followed to hold the markets.

The witness discussed the relation of the tariff to the steel industry at length, but he said that upon the whole he did not desire to have the tariff changed in any respect, considering it entirely satisfactory as at present arranged. Asked as to his opinion of the Babcock bill, which takes the duty off trust-produced articles, Mr. Schwab said he was opposed to it. He did not consider as possible an international iron and steel combination.

Discussing the relation of capital to labor, he said that, while he would not undertake to outline the future policy of the steel corporation, he did not indorse the policy of labor organization as in the interest of the laboring man himself. He did hope, however, to so arrange matters that operators could share in the profits of the enterprise. Instead of being a detriment, he considered the big corporations as affording the best openings for labor and enterprise.

"There were never such opportunities for brains as to-day," he said. "If I were a laboring man, as I once was, I should not want to belong to a labor organization if employed by a properly managed corporation like the steel company, for I would not want to be put on a level with the poorest laboring man in the establishment. The tendency is to give the highest possible price for proper service, and no member of a labor organization is in position to avail himself of such disposition."

He said that the average of wages paid now by the steel companies is higher than previous to 1892. The question was not one of wages, but of the management of business, with which the labor unions wanted to interfere.

Mr. Schwab expressed himself as opposed to the publicity of the accounts of corporations, and said he had no legislation to suggest for the regulation of corporations. In conclusion Mr. Schwab said he could see nothing but good to result from business combinations. He considered them of value both to the investor and to labor, and thought them calculated to extend business.

An English paper maker, speaking of American paper machines in English mills, is quoted as saying: "Yes, the machines will do 500 feet a minute, and our men can run them at that speed; the fact, however, is that with our coals at $6 a ton it does not pay to run a machine at over 350 feet a minute." The American experience with machinery in general is that, so long as there is not the slightest deterioration of product, the higher speed is more than proportionately profitable. There must be for the machines above referred to a speed so slow that no profit could result. The machines have presumably superseded others on account of their speed possibilities, and not to employ the speed, whatever the cost of the power, is the hight of absurdity. To do the additional 30 per cent. of work which the machines could do if they were allowed to, the coal would still have to be consumed to drive other machines, with the cost and maintenance of the machines and additional wages of operators.

The Civic Federation.

The National Civic Federation whose committee on Conciliation and Arbitration held a meeting in New York last week, will open a headquarters here in addition to the one in Chicago.

The Committee on Conciliation and Arbitration is one of fifteen committees of the federation. The other committees deal with questions of foreign relations, insular affairs, banking and currency, industrial combinations, inter-State and foreign commerce, consular and diplomatic service, military and naval affairs, education, immigration, municipal government, taxation, civil service, Indian affairs, and the negro question.

Commercial Review.

NEW YORK, Monday, May 13.

SUPPLY MARKET AND GENERAL TRADE NOTES.

Business in machinists' supplies and small tools is just about what it ought to be in highly prosperous times. The market lacks the sensational features of two years ago, such as the erratic prices due to a purchasing stampede and a wild raw material market, as well as the heart-burnings caused by inability to procure or furnish goods when wanted. Trade is now steady and smooth, of more than average volume and ruling at firm, steady prices. It may not be quite as active as in 1899, but it seems to be about as brisk as at this time in 1900. March being normally the month of heaviest business there are signs of a slight seasonable scaling off of demand since that time.

An unusually important contract in the grain-elevator line is expected to be given out this week by the New York Central. It will call for the equipment of a 2,000,000 bushel elevator at Weehawken, N. J., the terminus of the West Shore road, which is a part of the Central system.

Report of a combination of engine manufacturers to involve a number of the most prominent in the high-speed line is becoming quite explicit. It looks as if there might shortly be such a deal announced as effected.

The New York Glucose Company, which is establishing a plant by the Hudson river at Shady Side, N. J., has just let to the Webster Manufacturing Company a contract for the machinery for handling the material. The raw material will be taken from canal boats by marine leg apparatus and distributed to conveyors. It will be operated electrically. Other portions of the equipment previously ordered include Westinghouse generators and motors, engines of the Nordberg Manufacturing Company, and 4,000 horse-power of Babcock & Wilcox boilers.

One company engaged in the manufacture of power-transmission apparatus and other lines is so flooded with work that it feels itself mostly out of the market for large contracts.

Peter A. Frasse & Co., of this city, have bought out the equipment of the Chicopee Falls plant of the American Bicycle Company.

A. J. Barnes, of the Whitman & Barnes Company, manufacturers of twist drills, as well as other goods, largely in the agricultural line, is making an extensive business tour through some of the British colonies. He left San Francisco about a year ago for Australasia and about the beginning of this year came on to South Africa. In the former region his business results have been highly gratifying. South Africa, of course, is under the spell of war influences. There was a little revival of trade about February or March, but it was followed by a setback attributed to Boer activity in the Cape, together

with the epidemic that had broken out. The reaction, indeed, was so marked that some tradesmen in the Transvaal are said to have cancelled their orders.

A traveling man for a local house who has been making a trip through Cuba, Mexico, etc., found Cuban trade flat. He transacted some business in Mexico, but after having journeyed for some distance in that country he judged that conditions did not warrant his continuing farther.

The American Gas Furnace Company, who have previously installed a considerable quantity of their machinery at the Philadelphia mint, have now been asked to equip with their apparatus all the departments. Gas will therefore be employed in the melting and refining, coining, machinists' and engraving departments, etc. The company has also had the official assurance of contracts to equip the Denver and San Francisco mints. They have already partly equipped the New Orleans mint; so the use of gas is making a pretty clean sweep in mint operations throughout the country. Among

The American Tool & Machine Company, Boston, Mass., has moved its New York office from 41 Park Row to the St. Paul Building at 220 Broadway. Mr. G. F. Kenney is in charge as heretofore.

The Western Electric Company, of Chicago, reports an exceedingly heavy demand for fan motors this season. Their total sales thus far for 1901 have by far exceeded those of any previous year. The demand from abroad is especially heavy, unusually large orders coming from India and in fact from the British possessions generally.

CHICAGO MACHINERY MARKET.

The representative of a large machine-tool builder gives it as his theory that machine shops should be equipped with 10 per cent. more capacity than their current wants, in order that they might be in a position to take care of any quick business offered to them. Asked if any shops were so equipped, he replied that manufacturers bought machine tools only when they could not avoid it. He was lamenting the loss of an order for two machines

Machinery, Machines, and Parts of—	March— 1900 Number.	March— 1900 Dollars.	March— 1901 Number.	March— 1901 Dollars.	Nine Months Ending March— 1899 Number.	1899 Dollars.	1900 Number.	1900 Dollars.	1901 Number.	1901 Dollars.
Cash Registers	....	68,221	955	86,939	....		....	613,269	9232	738,206
Electrical	....	473,119	...	561,433	....	2,080,739	....	2,906,031	....	4,339,106
Laundry Machinery	....	38,052	....	46,261	....		....	301,364	....	324,299
Metal-working	....	703,460	....	250,019	....	4,832,569	....	5,389,444	....	3,257,499
Printing Presses, and parts of	....	107,287	....	58,634	....	589,251	....	912,301	....	837,662
Pumps and Pumping Machinery	....	303,842	....	183,079	....	1,974,007	....	2,351,060	....	1,680,215
Sewing Machines, and parts of	....	426,209	....	316,440	....	2,282,333	....	3,328,348	....	3,144,092
Shoe Machinery	....	139,522	....	83,092	....	664,092	....	885,196	....	695,336
Steam Engines, and parts of—										
Fire	....	.....	1	625	1	260	1	8,135	11	18,470
Locomotive	62	605,509	32	249,288	372	3,432,674	394	4,095,534	315	3,077,453
Stationary	82	43,324	72	118,536	357	214,431	821	463,337	874	702,142
Boilers and parts of Engines	....	98,949	....	96,666	....	865,497	....	1,235,906	....	1,290,569
Typewriting Machines, & parts of	....	272,447	....	292,379	....	1,684,079	....	1,998,589	....	2,078,000
All other Machinery, and parts of	....	2,219,958	....	1,261,866	....	13,721,604	....	15,945,175	....	15,076,712

UNITED STATES OFFICIAL STATISTICS OF EXPORTS OF MACHINERY OF DOMESTIC MANUFACTURE INCLUDING MARCH, 1901.

private concerns the company finds good customers in the General Electric and Westinghouse works. It has also lately got an order for a plant for the Weston Electrical Instrument Company, of Newark, N. J. The Money-Larue Laundry Company, Elizabeth, N. J., has bought one of its gas plants, a great economy being claimed for the use of gas for such purposes as heating irons, compared with old methods. An order for a plant has come from the Wiswell-Pritchard Electrical Manufacturing Company, Niles, Ohio, this being attributed to an installation previously made for the New York and Ohio Company, manufacturers of electrical supplies at Warren, Ohio. The American Gas Furnace Company has estimates in on some of its appliances for the new British Westinghouse works. That the company is emphatically busy is hardly necessary to add to what has already been said.

The beginning of May has been marked as usual by a number of changes of location in the local machinery district.

because he could not promise delivery until next September. Had the buyer not been so pressed for the tools, this representative would have made the sale. But it is not the rule that builders cannot make shipments earlier than four months. Quite the contrary. Stocks in store are usually well in hand and on some goods the supply is much in advance of demand. Planers, on the contrary, are firm, with general scarcity.

The demand for machine tools shows visible improvement as compared with a month ago. The brisk buying comes mainly from the country and is usually in the nature of small additions made to equipment. There is the element of urgency in these negotiations and the seller who has in stock the machine desired gets the business. Concerning the city trade there are various reports. With some houses the inquiry is pronounced excellent, others say it is only passably fair. Considerable business is still in sight, but there is no rush to close the negotiations on the part of the prospective buyers. In the larger centers there is perceptible the hesitation due to pending negotiations between manufacturers and the machinists on the nine-hour proposition. But uncertainty in that respect will in all probability end this month and in consequence a good June trade is anticipated in machine tools, part of it being the spring buying, slightly delayed for the reason above stated.

Among sales recently made by Hill, Clarke & Co. were two largest-size grinders to the E. P. Allis Company and to the Nordberg Manufacturing Company, Milwaukee. John H. Dawson has sold a machine-shop outfit to a new steel range plant at Cedar Grove, Wis., and a large number of tools to the Moline (Ill.) Plow Company, who are starting a gasoline engine department to their works.

The H. B. Smith Company say they are behind in their orders for woodworking machinery. The building operations are very active in all parts of the West and Northwest and planing mills and similar industries are running overtime and unable to keep even with their orders.

J. B. Doan & Co. report a good trade. They are now located at their large new offices and warerooms, 34 and 36 South Canal street, corner Washington, where space is about double that in their old location and where light reaches them from the two streets.

Quotations.

NEW YORK, Monday, May 13.

Pennsylvania Foundry Pig Irons, Jersey City delivery, good brands

No. 1 X.....$15 75 @$16 25
No. 2 X..... 15 25 @ 16 00
No. 2 plain..... 14 50 @ 14 75
Gray forge..... 14 25 @ 14 50

Alabama Pig, New York delivery:

No. 1 foundry, or soft.... 15 75 @ 16 00
No. 2 foundry, or soft.... 15 25 @ 15 50
No. 3 foundry..... 14 75 @ 15 00
Foundry forge, or No. 4.. 14 50 @ 14 75

Bar Iron—Base sizes—Refined brands, mill prices on dock, 1.55 @ 1.65c.; from store, 1.80 @ 1.90c.

Tool Steel—Base sizes—Good standard quality, 7c.; extra grades, 10c. and upward.

Machinery Steel—Base sizes—From store, 1.90 @ 2.00c.

Cold Rolled Steel Shafting—Base sizes—From store, 2½ @ 2¾c.

Copper in carload lots—Lake Superior ingot, 17c.; electrolytic and casting, 16⅝c.

Pig Tin—26¾c., for 5 and 10-ton lots, f. o. b.

Lead—For wholesale lots, 4⅜c., with .02½ @ .05c. extra for carloads.

Spelter—4c., New York.

Antimony—Cookson's, wholesale, 10⅜ @ 10½c.; Hallett's, 8¾c.; Hungarian, Italian and Japanese, 8⅝c.

Lard Oil—Prime City in jobbing lots, 68c.

A Modern German Machine-Tool Shop, the Deutsche Niles Werkzeugmaschinen-Fabrik—I.

As most of our readers know, the "Deutsche Niles" shops have been regarded with special interest here in America ever since the organization of the company, and it has been expected that the shop buildings and equipment would be as good as the highest engineering ability and experience, backed by abundant capital, could make them.

The editor of this journal visited them about a year ago, and, like others that have seen them, was much impressed by the thorough manner in which everything pertaining to shop arrangement had been studied, and the results embodied in brick, mortar, steel and glass.

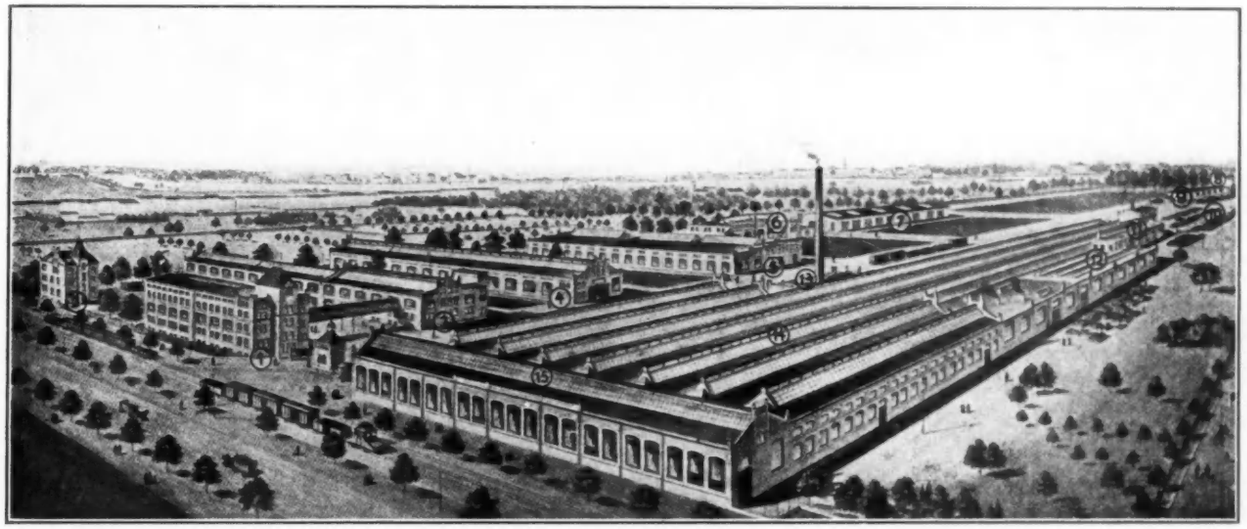


FIG. 1. GENERAL VIEW OF THE DEUTSCHE NILES WERKZEUGMASCHINEN-FABRIK, BERLIN.

1. Administration Building. 2. Official Dwelling House. 3. Parterre: Washing and Dressing Rooms, Baths, Dining Room and Cantine. First Story: Technical Office and Pattern Shop. 4. Blacksmith Shop and Steel Storage. 5. Pattern Storage. 6. Brass Foundry. 7. Lumber Storage Sheds. 8. 20-Ton Swinging Crane. 9 Coke Sheds. 10. Storage Place for Raw Materials. 11. Iron Foundry. 12. Core Shop. 13. Boiler House. 14. Manufacturing Shop. 15. Erecting Room.

The great increase in the industrial development of Germany which has taken place within the past few years caused an extraordinary demand for machine tools, which the home builders were unable to meet. This, as our readers know, was the chief cause of the very large sale of American tools in Germany during the past seven years, and it was quite natural that German capital should be attracted to the business and an effort made to do as much as possible of this work and business at home.

The following well-known Berlin firms are the founders of the factory: Allgemeine Elektricitäts-Gesellschaft, Berliner Handelsgesellschaft, Born & Busse, Disconto-Ge-ellschaft, Dresdner Bank, Ludw. Loewe & Co. Actiengesellschaft.

In the carrying through of their plans, the founders were actuated by one main consideration, viz.: that the enterprise should connect itself with a prominent American establishment in order to profit from the beginning by the long years of American experience, and not to lose time and money by wearisome experiments. This idea led to a connection with the Niles Tool Works Company, of Hamilton, Ohio. A contract was closed with this company, according to which the German Niles company, in the production of its machines, has the right to use all designs and profit by all experiences of the American factory. Exact working drawings and models of all machines which the American factory builds, or will build in future, are thereby especially secured to the new enterprise.

The work of building the factory was begun in November, 1898, and as early as December, 1899, the work in the pattern shop could be started. The other buildings were completed in the beginning of the year 1900, so that the whole factory was finished inside of about fifteen months. Since the beginning of 1900 all the different departments have been in working order.

GENERAL LAY-OUT.

The importance of a regular progression of the raw material through its various stages to a finished product, from its receipt at one end to final shipment at the other, is so well understood to-day that it is hardly necessary to say that this consideration was paramount in governing the choice of locality and arrangement of plant. The almost rectangular plot secured, with water frontage along one side and a railway passing the other, made an ideal site, allowing a full realization of this fundamental requirement. A wide right of way through this land to form the approach to a bridge, the right to build which was upheld by an obstructive landowner on the other side of the river Spree (an Anglo-German time-honored pun finds in this name the cause of the continual good nature of the residents along its banks), was brought to the attention of the designer of the plant at a rather late date, to the utter disarrangement of his plans; but the enforced new grouping finally resulted in what proved to be a better layout. All the tributary buildings are made to face on this street, which, with its grass plots dividing the driveway from the railroad track, lends quite an air of distinction to the whole.

A portion of the land was covered by forest trees that formed part of a park belonging to an old estate, now serving to give pleasure to the many brought from overworked Berlin by busy pleasure steamers. During all the building operations great care was taken to preserve every tree possible, while after their conclusion all of the free space left was nicely leveled and sown with grass. Aside from the pleasing contrast of the lively green of the grass with the buff of the buildings, these lawns serve an eminently useful purpose in binding the very fine loose sandy soil, so that the high winds of spring and fall cannot carry it into the buildings to play havoc with the machine bearings.

The location of the factory with reference to obtaining the necessary workmen is very favorable, since the place can be reached very conveniently as well from the center of Berlin as from other neighboring localities.

The total area of the factory comprises a space of 72,119 square meters (about 18 acres), of which about 32,000 square meters (about 8 acres) are covered with buildings, and the establishment is calculated for employing from 1,200 to 1,500 men in building of medium and heavy machine tools. The total cost of the establishment, including real estate and machine tools, amounts to about six million marks ($1,500,000).

The buildings comprise, as may be seen

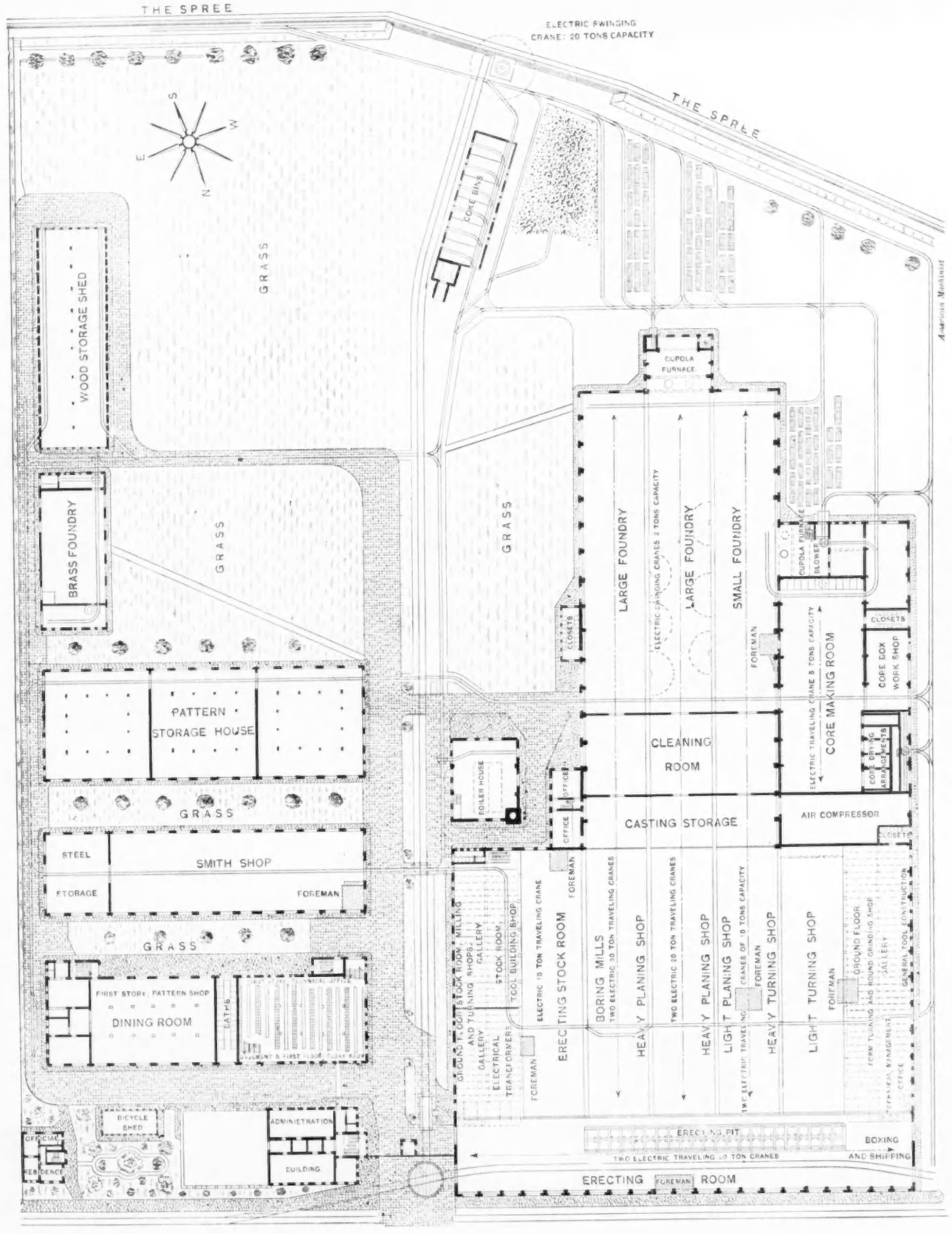


FIG. 2. GENERAL PLAN OF THE WORKS AND GROUNDS.

FIG. 3. MAIN ENTRANCE TO WORKS.

by view Fig. 1 and plan Fig. 2, office building; dwelling house for the day watchman and two foremen; bicycle hall; pattern shop containing on the ground floor washing and dressing rooms, bathing rooms, dining room and kitchen, and on the first floor the drafting room and the pattern shop; blacksmith's shop; pattern storeroom and general stockroom; brass foundry; lumber shed; shed for coke and oil; main building consisting of machinery room, foundry, cleaning room, storeroom for castings, core-making and core-drying room.

We will now undertake a detailed description of the various shops, which will be illustrated by photographs showing such views as one would get in going through them.

From the street front, Fig. 3, with its single track connecting with two different main lines at Nieder-Schöneweide and Rummelsburg, there runs a wide shop street for foot, horse and railway cars running to the water front. To the left of this street, as one enters at the gate (Figs. 3 and 4 show it from opposite ends) are all of the office and so-called "workmen's welfare" buildings, together with the subsidiary shops for light work, such as pattern and blacksmith shop, pattern storehouse, foundry and lumber shed; to the right are the main foundry with its tributary departments and the various machine and erecting shops. In Fig. 5 the coke shed unfortunately shuts off the view of part of the water end of the foundry.

The raw material—pig iron, coke, coal, lumber, etc.—arrives, according to season or place of original shipment, either by water or rail, and is unloaded at the lower

FIG. 4. VIEW OF MAIN STREET RUNNING THROUGH GROUNDS. END OPPOSITE FROM THAT SHOWN IN FIG. 3.

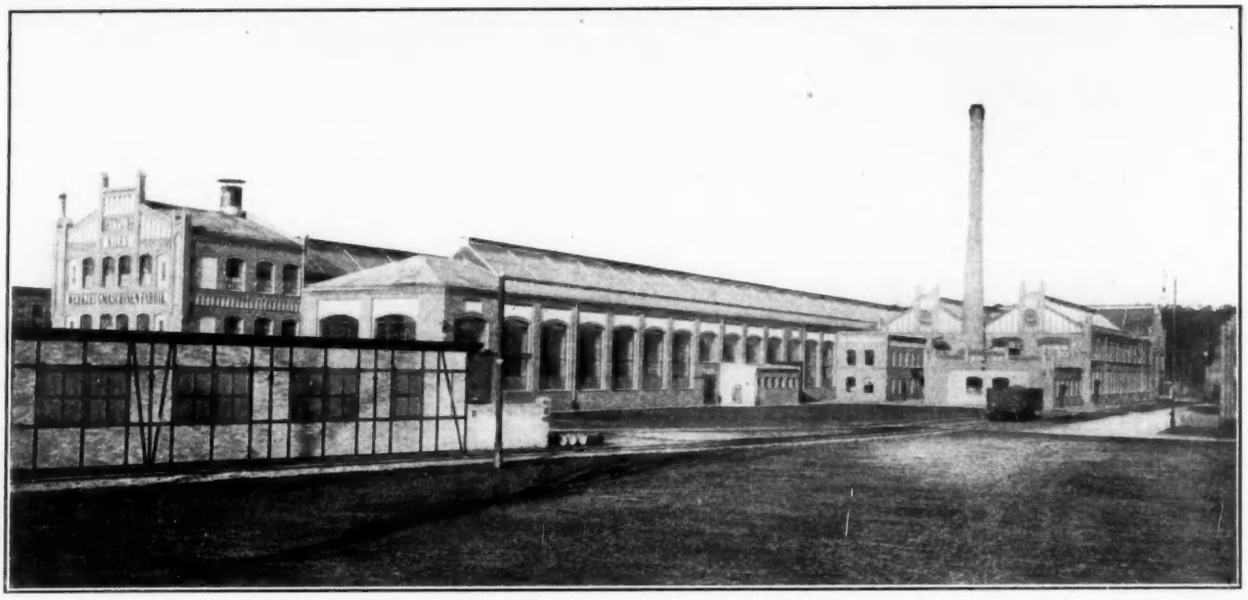


FIG. 5. VIEW OF SOME OF THE SHOP BUILDINGS AS THEY APPEAR FROM THE RIVER.

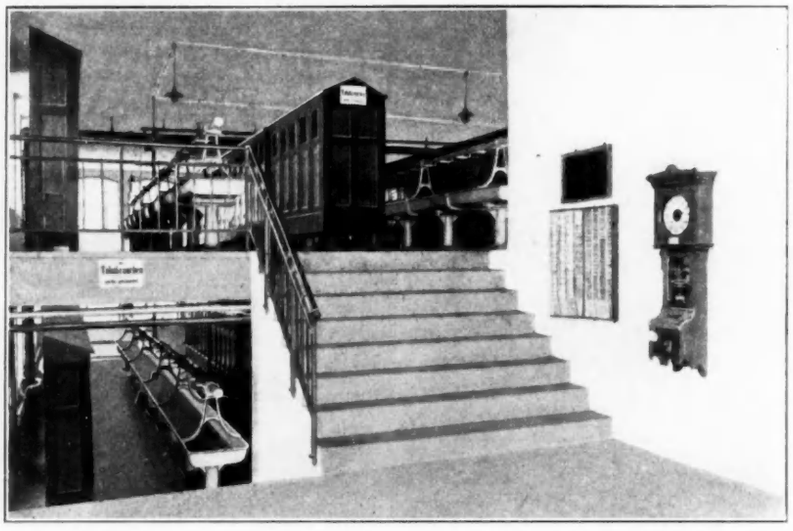


FIG. 6. VIEW FROM NEAR ENTRANCE TO WASH- AND LOCKER-ROOMS.

end of the grounds. In the buildings, to the left, some of it is worked up into patterns, brass castings or forgings, as the case may be, in shops conveniently placed opposite to those of the main building in which these parts enter their next stage on the way to completion. The pig iron with the material necessary to its conversion into castings is carried directly forward successively in various stages through foundry, cleaning and storage to be united with the other materials coming from the left, and side by side with these to progess forward through the erecting shop to the cars for shipment by way of a standard-gage railway track running through the length of the erecting shop. All of these buildings are connected by well-paved streets of liberal width and a general system of narrow-gage tracks.

In planning the buildings due regard had to be paid to the requirements of stringent building laws that did not permit the roofing in of more than half the total area, and called for open spaces of a width not less than a certain proportion of the hight of the adjoining buildings. Here, too, the designer had his equanimity sadly disturbed on finding his carefully hatched plans ruthlessly overthrown by the building police in authority. In justice it may be said that this supervision is after all a good thing for all concerned, as the laws are fairly and liberally interpreted to give healthful surroundings; it is true that the initial cost is increased, but as this bears alike on all who build shops it results in no real disadvantage to anyone.

WASH AND LOCKER ROOM.

The men pass the porter's lodge of Fig. 3 through the widely opened, ornamental iron gates, which are creditable, though simple examples of a branch of the blacksmith's art highly developed in Germany, turn the corner of the office building and enter the first door in the side of the next building to find themselves in a well-

FIG. 7. VIEW OF MEN'S DINING-ROOM, LOOKING TOWARD KITCHEN SEEN IN FIG. 8.

appointed, two-storied wash and locker room. Care has been taken to so plan the arrangement as to avoid all crowding and

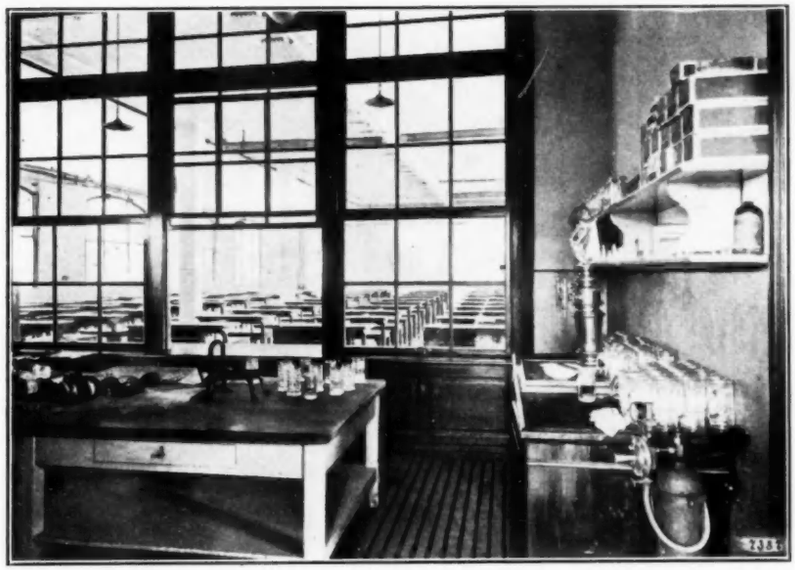


FIG. 8. VIEW IN KITCHEN, LOOKING OUT INTO DINING ROOM.

jamming; immediately at the entrance the stream of men is divided, half going to the upper and half to the lower tier.

The cast iron, white enameled wash-basins have a separate tap of clear warm water for each man. This tap bears a number that is identical with that on a locker immediately behind it. Basins and lockers are alternately arranged in rows across the room. The lockers are raised well clear of the floor, have a ventilating bottom and ventilating grid in the upper part of the door and a continuous shed roof that will prevent converting it into a storage space for such uncon-sidered trifles as beer bottles, boots, etc.

Fig. 6 shows a view taken through the exit door of this room, and shows also one of the workmen's time-keeping clocks. Similar clocks are placed in the various departments, so that the men register the actual time at which they enter and leave their places of work; this allows them to take as much time for washing and changing their clothes as they please, and without detriment to the firm. The clock here shown is for the general yard men. In order further to avoid crowding, the troughs are shortest near the entrance and gradually lengthen toward the other end of the room, thus narrowing the side aisle down as men leave it. A reversal of this arrangement at the other side of the room takes care of the increasing number of men near the exit.

BATHING FACILITIES.

Immediately adjoining this washroom is a well-patronized bathroom containing four set baths and sixteen shower baths with hot and cold water. These are intended specially for the workmen, but are also used by the draftsmen and the office men at such times as they are not taken up by the shop. Each workman receives in his pay envelope a bath ticket with his name, which he may deposit in one of a number of boxes distributed about the works. These tickets are collected, and

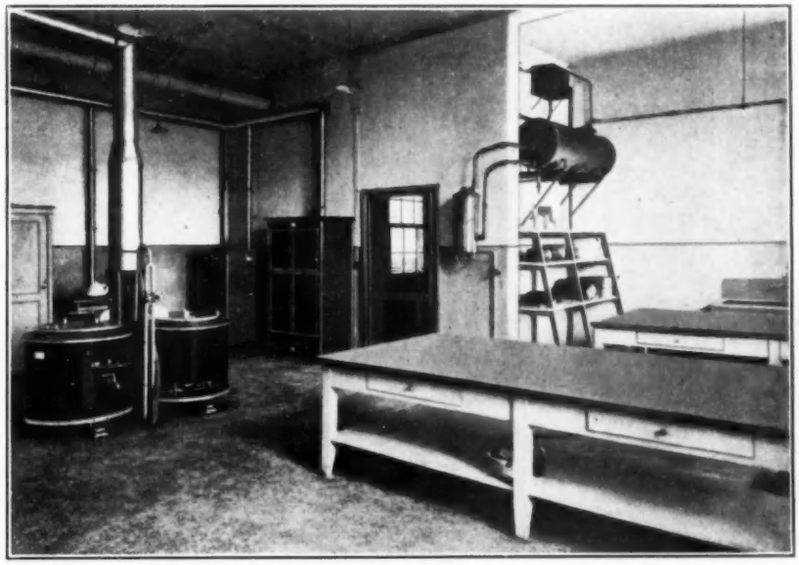


FIG. 9. VIEW IN KITCHEN, SHOWING COOKING APPARATUS.

FIG. 10. OFFICERS' AND FOREMEN'S DINING-ROOM.

supplied with a note as to the time when a bath is free, which must then be taken at the specified time. Twenty minutes are allowed for a bath, and a half-hour altogether for remaining away from work for this purpose. No deduction is made from a man's pay for this time. Bathing hours are from 8 to 12 and from 1 to 6 on ticket; allowing a half-hour for bath and cleaning, this gives for twenty cells a total of 1,860 baths per week. Between 12 and 1 and 6 and 7 the baths are open to foundrymen and blacksmiths without a special permit. Unfortunately, it was found impossible to so place the camera as to get a picture of this room, but the general arrangement is evident from the plan, Fig. 2.

DEPARTMENT OF CUISINE.

Such of the men as do not leave the works during the dinner hour are obliged to take their lunch in a conveniently ar-

ranged dining-room on the ground floor of this second building. Fig. 7 is a view from the lower end, showing the room about half filled with tables and benches. The present seating capacity is 360, but there is ample room to accommodate twice that number. This room is also thrown open to such members of the men's families as may bring their lunch to them.

A well-cooked meal, consisting of soup, meat and vegetables, is served to those who wish it for a trifle under 10 cents, while others wishing less can be supplied with soup, sandwiches, etc., etc., at rates ranging down to 1 cent. Beer, coffee and, in winter, hot beef-tea of excellent quality are also supplied at noon time, as well as for the usual second breakfast and afternoon lunch; but these are carried to the men at their places of work. Beer is sold at the usual outside rates, while other non-alcoholic drinkables are served at merely nominal prices. Fig. 8 is a view over a corner of the serving table through the glass sliding partition into the dining room, while Fig. 9 shows a corner of the kitchen with its three gas boilers near the center for soup, vegetables and coffee, a three-tier gas roasting oven in the corner,

FIG. 11. DWELLING-HOUSE OF DAY-PORTER AND FOREMEN. SURGERY ON GROUND FLOOR.

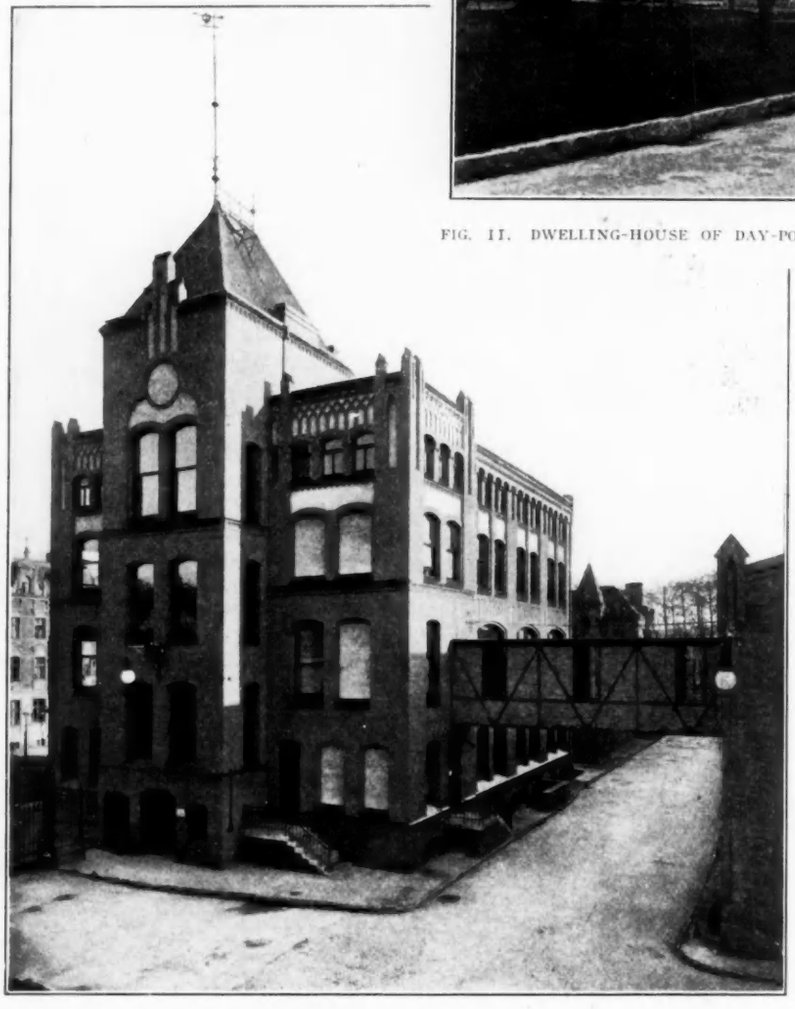


FIG. 12. SIDE VIEW OF OFFICE BUILDING. BRIDGE LEADS TO DRAFTING ROOM.

and a gas-heated dish-washing closet next to the door. Fig. 10 shows a picture of another dining-room, set apart for the foremen and office force. This also serves for the weekly conferences between foremen and management. This canteen is run by the works, and not for the individual profit of a licensee. It is intended to so run it that it shall just pay a trifle more than expenses, the profit to go to a workmen's benefit fund. Not having been long in operation, it is at present still run at a loss, which is shouldered by the firm; which has also contributed the entire fittings free of charge.

DWELLING HOUSE AND SURGERY.

Leaving the dining room there appears in front and somewhat to the left the building Fig. 11. This is a dwelling house tenanted by the day-porter and by two foremen, one of whom is charged with the maintenance of the entire fixed plant, while the other looks after the electric light and motor plant, as well as all shafts and countershafts. One of the ground floor rooms—that with the outside door to which the short flight of steps leads—is fitted up as a well-appointed surgery in charge of a certificated male nurse, where all minor injuries are attended to

FIG. 13. BUILDING FOR DRAFTING ROOM, BATH- AND WASH-ROOMS, ETC.

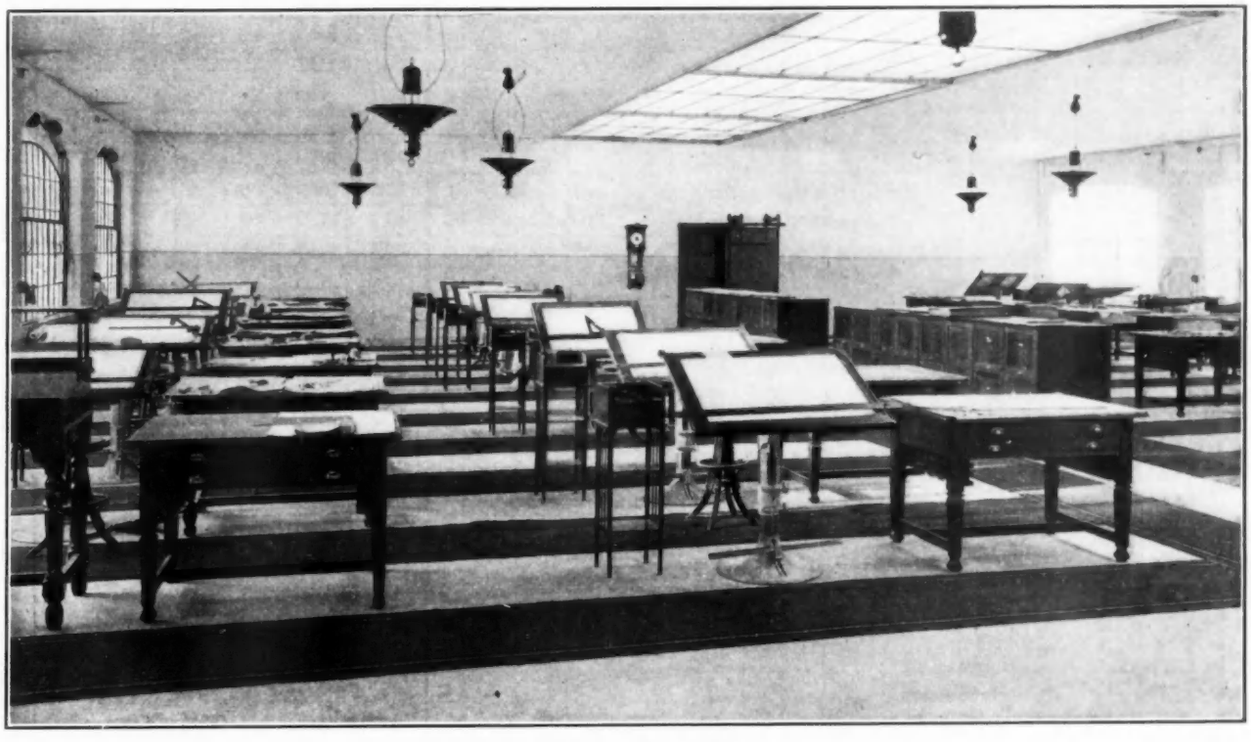


FIG. 14. VIEW IN DRAFTING ROOM.

at once. Between this house and the office there is a neat garden with lilac, syringæ and other flowering bushes, as well as a few indeciduous trees to show a little green during the winter. To one side of this garden is a commodious enclosed shed for the safe and dry storage of bicycles.

Entering the office building, Fig. 12, there is found on the first floor, beside the waiting room already alluded to, a commodious cost-keeping and cashier's office on one side, while the other is devoted directly to the payroll and the not inconsiderable work attendant on the compulsory, official, workmen's benefit insurance; between the two is a double, fireproof vault.

The second floor, reached by a wide, easy flight of stairs, is devoted to the uses of the managing directorate with its immediate assistants, while the third is given up to the typewriters, stenographers, the correspondence and other files.

A bridge, Fig. 12, leads directly into the drafting room, that occupies the front end of the second story of the adjoining building of Fig. 13, whose lower story, with its wash- and bath-rooms, etc., has already been inspected. This room, Fig. 14, is at present occupied by some thirty draftsmen, each of whom is supplied with a drawing table, a revolving stool, a side table and a small stand for tools, books, etc. These are arranged in two rows on each side of a central line of special drawing cases. There is also a standing desk for the accommodation of the office bookkeeper. The chief draftsman has an enclosure at one corner of the upper end, which does not appear in the picture, while the opposite corner accommodates six ample marble wash-basins and clothes-racks. The floor is covered with "Torgament," a proprietary preparation of sawdust and a mineral binder; it is applied in a plastic state and makes a very good, not too smooth surface, agreeable to walk upon, without cracks, and easily cleaned. Ample light is had from the sliding, iron-casemated windows at the sides and front, and the central wire glass skylight. Artificial illumination of a very satisfactory character is supplied by inverted arc lamps; its uniform distribution is aided by the smooth ceiling, walls and floor, that are all in various harmonious shades of pale and darker gray. The distribution of light is so good that at night there is very little shadow under a hat held a foot above a drawing-board.

A door opposite the entrance from the office building gives into a staircase leading down to the yard and up to the photographic and blueprint rooms. The latter are at the top of the staircase, have two walls of plate glass and a gallery running around three sides for exposing the blueprint frames in clear weather. A portion

of this gallery can be seen to the right of Fig. 13. The room in front of the exposing room is devoted to the washing and drying of prints, while that underneath is fitted up as a photographic laboratory. The various photographs accompanying this description were all taken by the shop photographer, and are excellent.

(To be continued.)

NUMBER OF TEETH	INDEX FOR	GEAR ON WORM	1st GEAR ON STUD	2nd GEAR ON STUD	GEAR ON SPINDLE	IDLERS
51	50	40			32	2
53	56	56	40	24	72	0
57	56	56			40	2
59	60	72			48	1
61	60	72			48	2
63	60	32			64	2
67	70	28			48	1
69	70	56			32	1
71	70	56			32	2
73	70	28			48	2
77	80	48			72	1
79	80	64			32	1
81	80	64			32	2
83	80	48			72	2
87	90	48			64	1
89	90	72			32	1
91	90	72			32	2
93	90	48			64	2
96	100	40			64	1
97	100	40			48	1
99	100	80			32	1
101	100	80			32	2
102	100	40			32	2
103	100	40			48	2
105	100	32			64	2
106	100	40	48	32	64	1
107	100	40	56	32	64	1
109	100	40	64	32	72	1
111	120	24			72	1
112	120	24			64	1
113	120	24			56	1
114	120	32			64	1
117	120	24			24	1
118	120	48			32	1
119	120	72			24	1
121	120	72			24	2
122	120	48			32	2
123	120	24			24	2
125	120	24			40	2
126	120	32			64	2
127	120	24			56	2
129	120	24			72	2
131	140	28			72	1
133	140	32			64	1
134	140	56			64	1
137	140	56			48	1
138	140	56			32	1
139	140	56	24	48	32	0
141	144	48			40	1
142	140	56			32	2
143	140	56			48	2
146	140	28			48	2
147	140	32			64	2
149	140	28			72	2
151	160	32			72	1
153	160	32			56	1
154	160	48			72	1
157	160	64			48	1
158	160	64			32	1
159	160	64			48	1
161	168	48			80	2
162	160	64			32	2
163	160	64			48	2
166	160	48			72	2
166 2/3	160	24			40	2
167	160	32			56	2
169	160	32			72	2
171	180	32			64	1
173	180	72	56	32	64	0
174	180	48			64	1
175	180	72	40	32	64	0
176	180	72			64	1
177	180	72			48	1
178	180	72			32	1
179	180	72	24	48	32	0
181	180	72	24	48	32	1
182	180	72			32	2
183	180	72			48	2
186	180	48			64	2
187	180	72	56	32	64	1
189	180	32			64	2
191	200	40			72	1
192	200	40			64	1
193	200	40			56	1
194	200	40			48	1
197	200	40			24	1
198	200	80			32	1
199	200	80	24	48	32	0
201	200	80	24	48	32	1
202	200	80			32	2
203	200	40			24	2
204	200	40			32	2
206	200	40			48	2
207	200	40			56	2
208	200	40			64	2
209	200	40			72	2
211	215	86	24	24	64	0
212	215	86			48	1
213	215	86			32	1
214	215	86	24	48	32	0
217	215	86			32	2
218	215	86			48	2
219	215	86	24	24	64	1
221	230	46			72	1
222	230	46			64	1
223	230	46			56	1
224	230	46			48	1
225	230	46			40	1
226	230	46			32	1
227	230	46			24	1
228	230	46	48	72	24	0
229	230	72	24	46	24	0
231	230	72	24	46	24	1
233	230	46			24	2
234	230	46			32	2
236	230	46			48	2
237	230	46			56	2
238	230	46			64	2
239	230	46			72	2
241	240	72	24	64	32	1
242	240	72			24	2
243	240	64			32	2
244	240	48			32	2
246	240	24			24	2
247	240	48			56	2
249	240	32			48	2
250	240	24			40	2

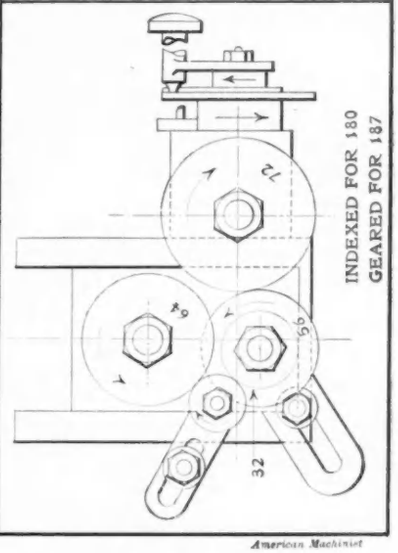


TABLE OF GEARS FOR COMPOUND INDEXING ON THE BROWN & SHARPE UNIVERSAL MILLING MACHINE.

Spacing for Prime Numbers on the Universal Milling Machine.

BY W. G. LUPER.

Having followed the De Leeuw method of spacing on the milling machine very closely as the different articles appeared in the "American Machinist," Mr. Beale's contribution in issue No. 13 is doubly interesting. His experience seems quite identical with our own, except that we did not try the spacing of 175 to a conclusion as he did.

We were placing graduations on the cross-slide screws of our lathes and since most of them were 6-pitch (for which I will never forgive the makers when 4 or 8 is much more reasonable) they required 166⅔ spaces to read thousandths, to the extent of one turn, which was very easily accomplished by the De Leeuw method. To profit by Mr. Beale's liberal solution, or, in fact, any solution or rule, one must possess a rudimentary knowledge of proportion or machine-shop arithmetic, so sparingly used by the craft in general.

Here is a rule that suggested itself after many calculations:

Select a number the machine will index for near the desired number; divide the selected number by 40, and the quotient will be the number representing the gear to be used on the worm. The difference between the number desired and the one selected will be the number representing the gear to be used on the spindle. The remainder of the problem is like calculating the gears to be used for screw cutting: *i. e.*, multiply both by some number that will give the gears at hand.

Example: Desired number, 177; number selected (and machine indexed for), 180; 180 ÷ 40 = 4½, gear on worm; 180 — 177 = 3, gear on spindle. Multiplying both by 16 gives 72 gear on worm and 48 gear on spindle.

Another: Desired number, 191; number selected, 200; 200 ÷ 40 = 5, gear on worm; 200 — 191 = 9, gear on spindle. Multiplying both by 8 gives 40 gear on worm, 72 gear on spindle.

Again: Desired number, 166⅔; number selected, 160; 160 ÷ 40 = 4; 166⅔ — 160 = 6⅔. Multiplying both by 6 gives 24 on worm, 40 on spindle.

I enclose a table of gears for use on a Brown & Sharpe milling machine for spacing all numbers from 50 to 250 not on our Brown & Sharpe card. 46 and 80 are the only gears we had to make to complete the list. The table was compiled by Mr. F. H. Sovereign, of our toolroom force, after we had made many joint experiments. I submit it in the hope that it will prove a help to the many who will not or cannot take the time to learn the theory and trust it will be of value to the craft in general.

Mr. Sovereign forwarded a copy of the enclosed table to the Brown & Sharpe Company and received a remittance therefor. If we are under any obligations not to use it in this manner, please advise me.

Mare Island Navy Yard.

Editorial note.—We submitted this entire matter to the Brown & Sharpe Manufacturing Company, who reply as follows: "We shall be pleased to have you make use of the table and would request that the following note accompany it:" The note is as follows: "Messrs. Brown & Sharpe have set up every combination of gears in this table and have corrected it in several places. In one case the gear ratio was not right; in another case the gears could not be mounted in place. For 211 and 219 the gears 86 and 24 reach each other, and hence they are treated as compound geared with two 24-tooth gears on the stud, in order to have the two combinations consistent with the rest of the table."

The table as here given contains the Brown & Sharpe corrections. The method has now been reduced to what appear to be its lowest possible terms. With the addition of two gears only to the usual outfit the range of work possible on the universal milling machine has been extended to include all numbers up to and including 250. Comparison of this table with the regular Brown & Sharpe table will show that up to that number there are no gaps. We count both our readers and ourselves as very fortunate in this whole matter. It is seldom that we have the satisfaction of publishing a more interesting contribution to machine-shop methods.

A Craftsmen's Club.

The following, from "The Practical Engineer," London, may contain a suggestion worthy of the attention of workmen in some of our American cities:

"A club, under the above title, open to all respectable men skilled or interested in any art or craft, was founded at a meeting held here [Birmingham] on March 26, 1901, and to invite applications from anyone interested in this movement. The object of the club is to enable readers of various technical papers to meet personally, to form a library to facilitate the acquisition of information in case of minor technical difficulties in perfecting and finishing work of different sorts, to encourage the undertaking of useful hobbies, to lessen their expense, and to increase their usefulness. Lectures and demonstrations are to be encouraged, and an effort made to take premises for the sale of work done by members. Full reports of proceedings will be obtainable, representatives are to be appointed in various towns, and a staff of experts and advisers appointed as the club develops. The subscription is 2s. 6d. [60 cents] quarterly.

"It is claimed that while the general idea of such a club is not new, there is a novelty in its method of seeking a common basis for active results, and the utmost precautions are being adopted to build up the club on good economical and financial principles. No dividend is to be payable. One-third of the fund is to be devoted to reserve, and to revert to charity if the club should dissolve.

"For the time being it does not seek the support of those of very limited means or time."

Why the last sentence was written is not obvious. Better take anyone who will pay the subscription, "and no questions asked."

The Luger Automatic Pistol.

BY GRAHAME H. POWELL.

The limited range of the revolver is due in great measure to the escape of the powder gas about the cylinder. This fact, in conjunction with other well-known drawbacks to the use of revolvers as military weapons, has caused inventors to look to the principles employed in magazine arms for a solution of the problem of an improvement of this essential small arm. What is known as the automatic pistol of to-day seems almost a perfect realization of the ends sought. Though called automatic this weapon is in reality only semi-automatic, as successive pressures on the trigger are necessary to its operation.

This weapon is a repeating arm in which the force of the expansion of the gas—the recoil, or "kick"—is utilized after each shot to open the breech-block, extract the empty case, cock the firing pin and, by means of a recuperative spring charge the pistol with a new cartridge, the operator merely having to press the trigger for each successive shot.

A great number of inventors have been interested in the question of automatic pistols, and the results of their labors have frequently been described in the technical journals as well as in special pamphlets. At the present time tests are being conducted by the various foreign governments with a view to the adoption of the most efficient weapon of this class. Among the arms tested are the Mannlicher, Mauser, Roth, Bergmann and Luger, and in the United States the Colt also.

As the United States War Department has recently conducted a test of the Luger pistol among others, and as this arm has been adopted by the Swiss Government, a people who do not reach conclusions hastily, it will be more particularly described. The details of the description are from an article which was written for the "Swiss Military Review" by Major de Meuron, a member of the commission which recommended the adoption of the arm by the Swiss Government.

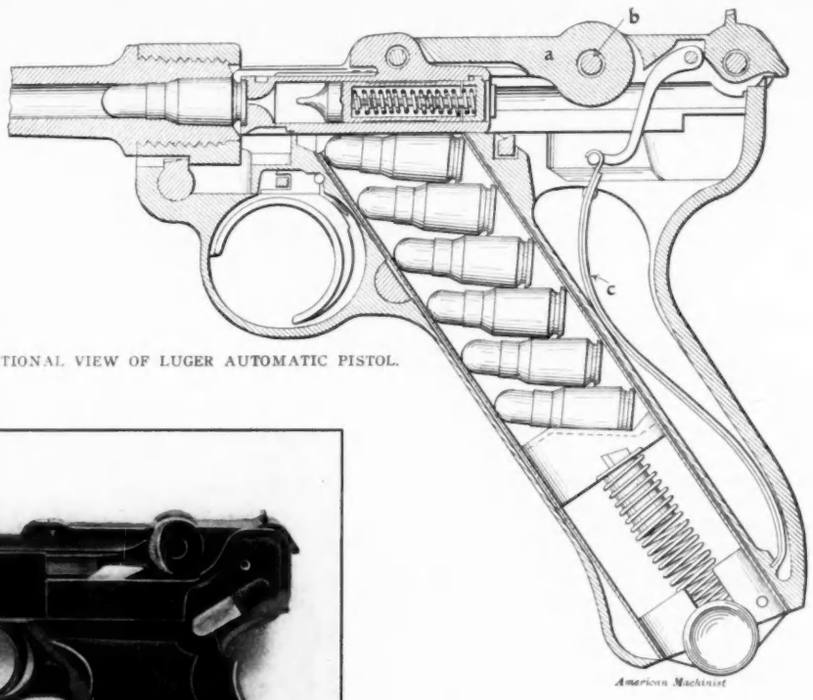
The Luger pistol is manufactured by the Deutsche Waffen und Munitions Fabriken of Berlin.

A study of the accompanying photographs will clearly indicate the operation of the arm.

At the moment of discharge, the gas acting upon the base of the cartridge case,

pushes to the rear the barrel and the breech-block, which slides along grooves in the framework. During this movement, which amounts to 5 millimeters, or about 3-16 inch, the movable breech and the barrel slide as one piece. The breech, however, continues to move by its momentum, the rollers of the knee or toggle joint bearing against the curved butt piece of the frame and causing a circular movement of the link *a* about its axis *b*, Fig. 4.

The knee rises until the moment when the main spring *c* contained in the stock is entirely compressed, as is also the percussion spring. The cartridge case carried



SECTIONAL VIEW OF LUGER AUTOMATIC PISTOL.

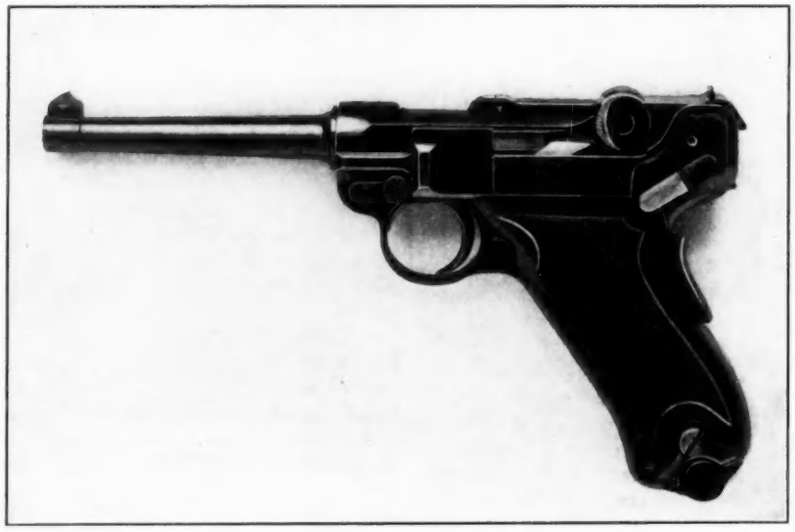


FIG. 1. THE LUGER AUTOMATIC PISTOL.

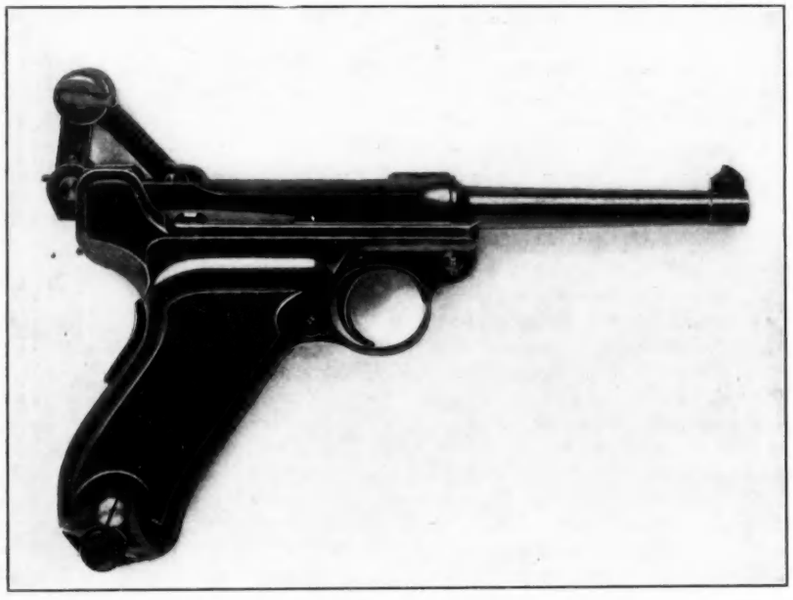
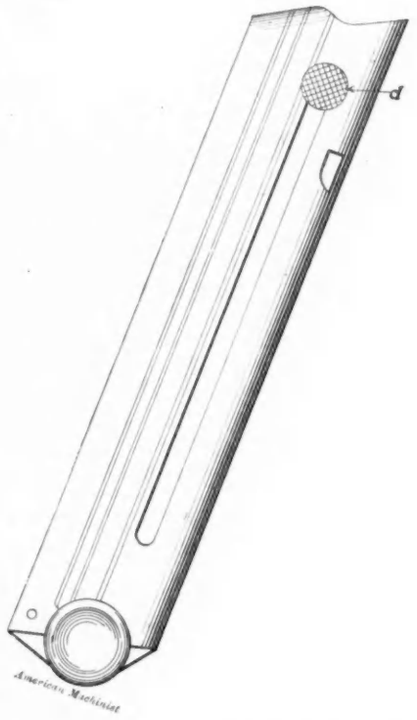


FIG. 2. THE LUGER AUTOMATIC PISTOL.

along by the extractor strikes against the ejector which throws it out. The ejector projects from the inner right-hand wall of the breech-casing.

The seat of the breech-block being clear, the upper cartridge of the magazine is pressed by a spring in the magazine in front of the head cylinder. The main spring, compressed by the recoil, pushes forward the breech-block through the medium of a stirrup which connects the two pieces. The knee lowers itself half way at the same time communicating its movement to the receiver and to the barrel, while the firing pin strikes against a lug (which projects from the inner left-hand wall of the receiver) and the percussion spring remains compressed.

As the knee straightens out, the barrel and the breech-block again act as one piece. The arm is thus again loaded, cocked and ready to fire. The firing pin being released by pressure upon the trigger springs forward and strikes the cartridge. After the last cartridge has been



MAGAZINE FOR LUGER AUTOMATIC PISTOL.

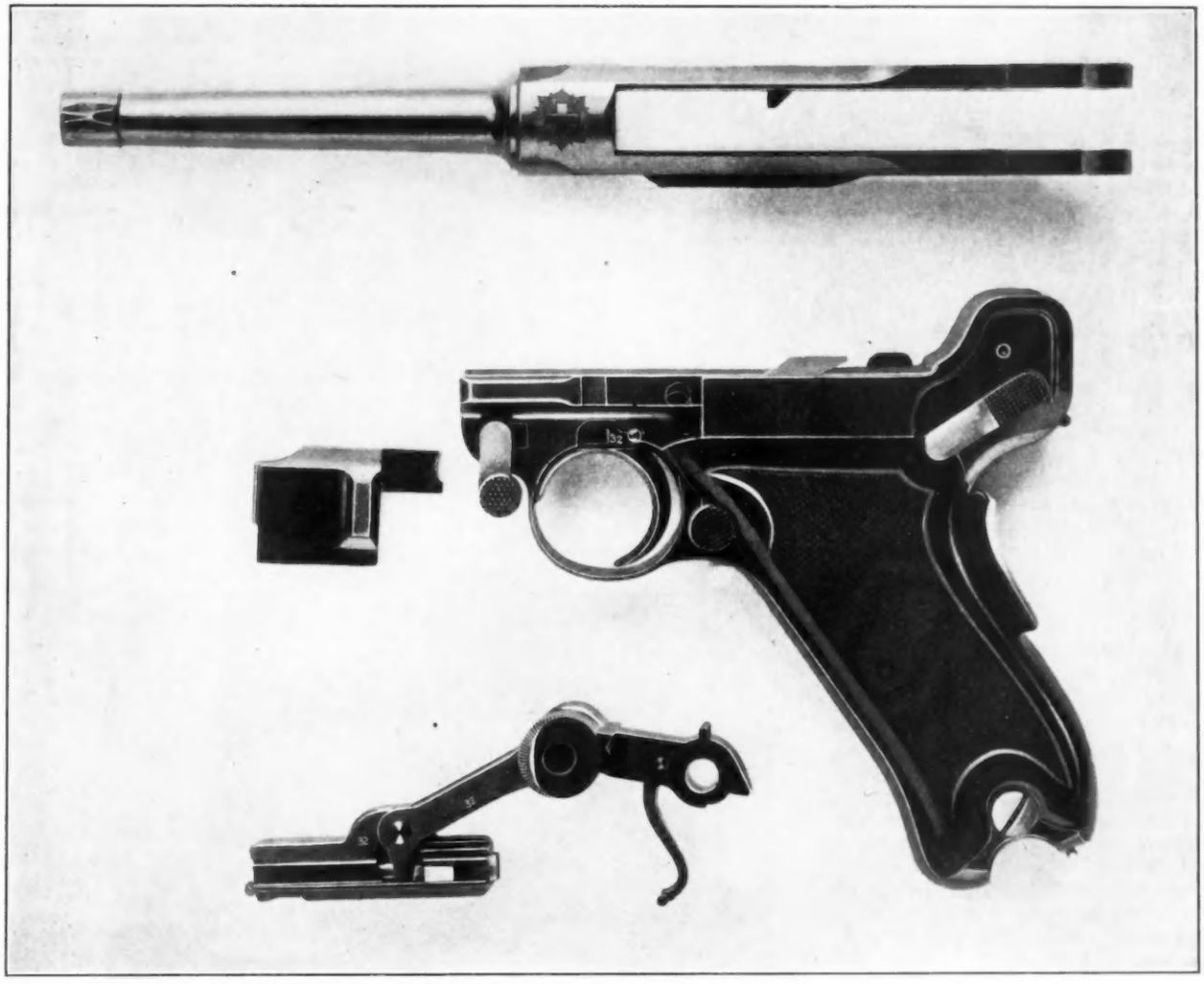


FIG. 3. THE LUGER PISTOL DISASSEMBLED.

fired, the button *d* on the magazine, Fig. 5, presses against a small spring which projects into the frame and engages in a notch in the cylinder, and the breech-block, instead of returning forward, is thus kept raised up as in Fig. 2. The line of sight being thereby entirely hidden, the operator is warned that the arm is empty and that he must reload by putting in a new magazine. This extremely ingenious arrangement does not exist in any other automatic pistol.

After the introduction of a new magazine into the stock, it is necessary only to draw the breech block slightly to the rear by means of the rollers grasped between the thumb and finger of the left hand, and allow it to snap into place, and the arm is again ready to fire.

The curved piece seen projecting from the rear of the stock near the top normally takes the position shown in Figs. 1, 2 and 3, and when it is in this position the pistol cannot be fired, because a portion of this piece interferes with the movement of the trigger. It also prevents the breech from being opened. In grasping the pistol by the stock, the hand presses on this part, and it is depressed and the breech block and trigger are again free to operate. The spring is very light, so that the pressure required to do this is scarcely appreciable.

The automatic safety device is especially designed for a military weapon. As the firer draws the pistol from its holster it is ready to fire at once. As soon as it is returned it is automatically placed at "safety."

As the weapon is also intended to be used for target practice, an additional mechanical safety device is provided. This consists of a small lever, just above and to the rear of the stock in Figs. 1 and 3. A small catch at its lower end, when the lever is pushed up, engages a slight projection on the piece last described, and the pressure of the hand can no longer act upon the mechanism of the automatic safety device, which is thus made immovable.

The following are some of the details of the Luger Pistol: Caliber, 7.65 m/m (0.301 inch); length over all, 238 m/m (9 5-16 inches); length of barrel, 120 m/m (4 11-16 inches); travel of bullet in bore, 107.2 m/m (4¼ inches); recoil of barrel until breech-block is separated, 5 m/m (3-16 inch); total recoil, 10 m/m (⅜ inch); rifling, four grooves, 3.1 m/m wide and 0.125 m/m deep; sighted for 50 meters (165 feet); length of line of sight, 214 m/m (12 5-16 inch); weight of arm without magazine, 835 gr. (29.5 ounces); weight of magazine, 57 gr. (2 ounces); velocity of projectile, 347 m. (1,140 feet per second); maximum gas pressure 3,160 atmospheres.

A File and Index for Notes and Clippings.

A new file and index for notes and clippings is being made by J. L. Dean, of Waterville, Me. It consists of a binder with stiff board covers, enclosing twenty-six manilla envelopes. Two sizes are made, one of which takes standard 6x9-inch pages without folding. The plain side of the envelope is ruled for indexing, and it is intended that this index shall include papers and documents not clipped, as well as those in the file. The method of indexing is shown in the accompanying list:

ELECTRICITY. ELE.

Subject	Authority	Issue
Power transmission by	Dr. Bell	E. W. 6-3-92
Heating by	E. Thompson	E. E. 7-12-90
Cost of lighting by	Clipping	Inside
Losses in long transmission by	E. J. Arnold	J. F. I. 6-15-90
Obtaining, direct from coal	Edison	Cen. 3-7-86
Polyphase current, the theory of	N. Tesla	E. R. 7-9-94
Generators for	Westinghouse	Inside
Storage batteries	R. E. Lee	Sci. A. 3-3-97
Tools driven by	Wm. Sellers	Inside
General theory of	Atkinson	Inside
Bleaching pulp by	"Debs"	P. T. J. 1-7-92

METHOD OF INDEXING.

An essential feature of the file is that by which the envelopes may be removed and rearranged. Those who have used similar devices in which the envelopes were fixed have found them to soon fail of their purpose. One envelope becomes full to bursting, while the next one to it may be nearly empty, but the contents of the full one cannot be divided and transferred without rewriting the index. This cannot be done at all if it is written in ink; and if in pencil, the erasing and rewriting is a nuisance. The same difficulty appears in aggravated form when the file becomes full and it is desired to remove part of the contents to a second volume.

With the present arrangement an empty envelope may be inserted where needed and part of the contents of another be placed in it, and when one volume is full, half of the envelopes may be transferred to another without disturbing the index, and additional envelopes be inserted in the first volume with finer subdivisions of subjects or of the alphabet.

A New Universal Miller.

The Garvin Machine Company, of New York city, has brought out a new universal milling machine, which is shown herewith, and which we think embodies a number of points of special interest. The most noticeable feature, perhaps, is in the entire absence of all feed pulleys, feed belts and their concomitants of overhanging brackets and universal joint connections. Other new features are in the feed change mechanism and the starting, tripping and reversing arrangements. For feeding two double cones of gears are employed, which give eighteen changes altogether, and of course greater extremes of feed than are practicable with a single cone of gears. A sliding spring key, which can be changed instantly without feeling for keyways, is the medium of connection. These gears run in an oil bath, and are contained in a compact box set into the hollow column. Any of the desired feeds are obtained by moving the two notched levers to the positions indicated by the index table, which also indicates rotations of spindle to 1 inch of feed (table, knee or saddle) produced by the combination of the gears in the gear box. The power feeds with automatic trips and reverse are supplied to all the motions of the machine. Reversing for all feeds is effected by one clutch playing between two bevel gears inside of the knee, and all the feeds are controlled by one handle, shown at the right front of the knee. This one handle serves to start, stop or reverse all the feed motions. All feeds are positive, but there is a slip friction to guard against accidents. A glance at the knee shows that there is a long in and out traverse, and it will be noticed that the upper part of the knee is of the box form. The fixed elevating screw and rotary ball-thrust nut are of a construction that gives ease of movement and avoids the necessity of passing through the floor or foundation. The table has three T-slots of a good depth, and is given a long bearing in the swivel block. All adjustments are provided with micrometer readings. The spiral head has a dividing gear of unusually large diameter, which not only conduces to original accuracy, but of course also adds very much to its endurance and to the permanence of accuracy. Two 11-inch disks graduated on the edge

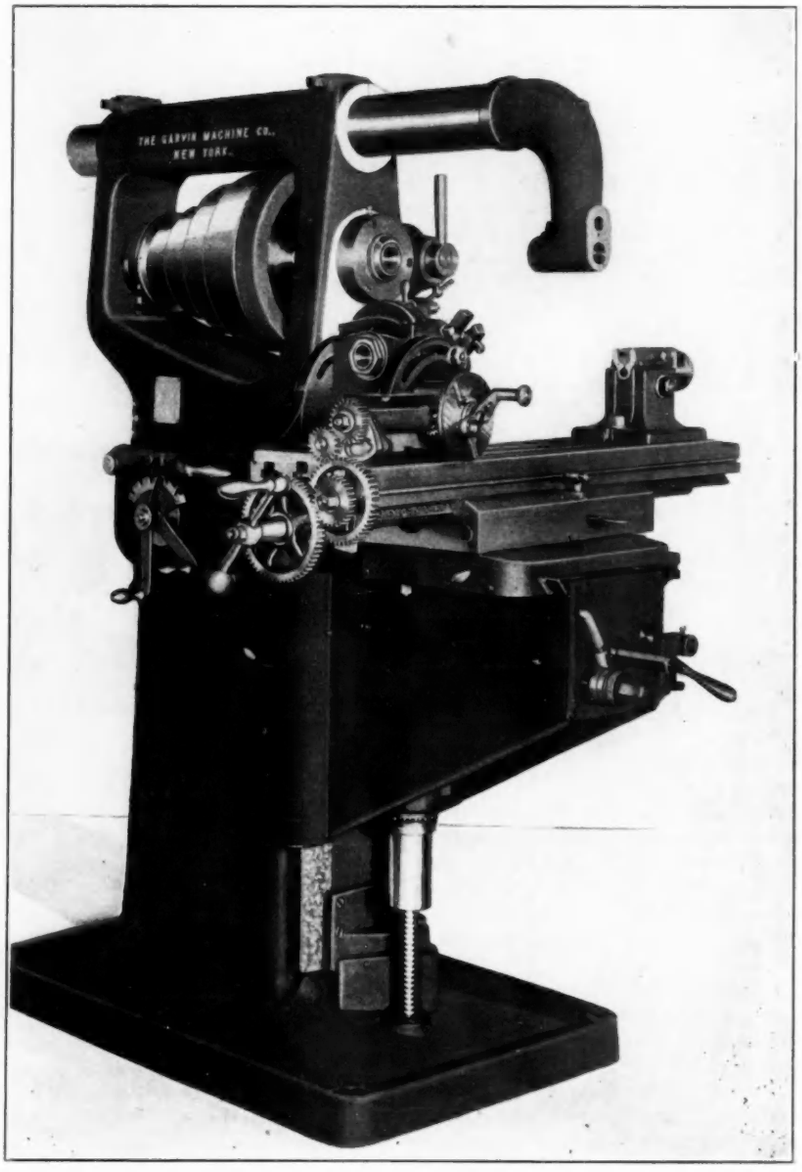


FIG. 1. NEW GARVIN UNIVERSAL MILLER.

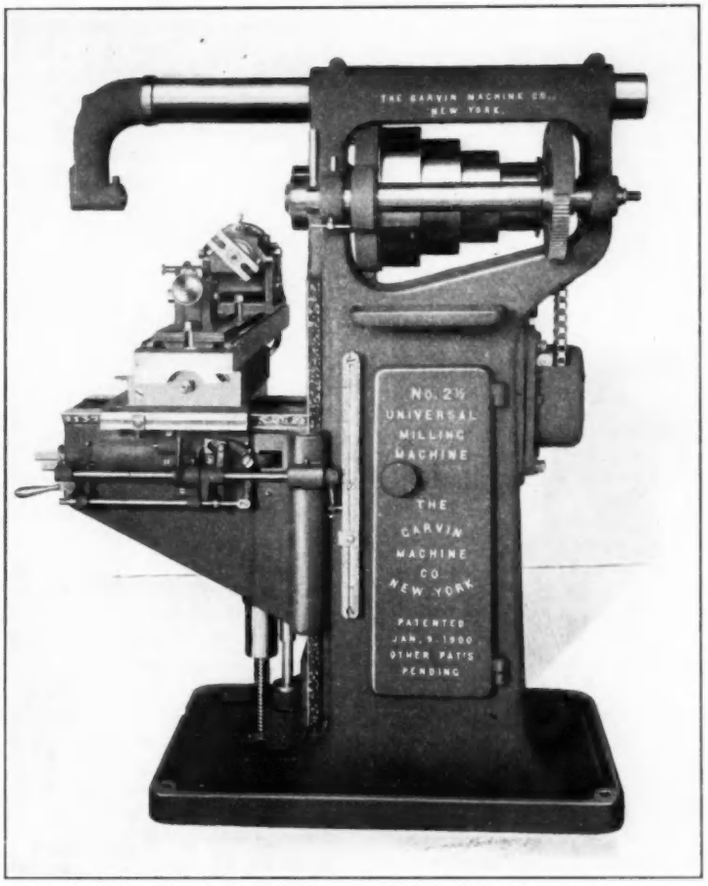


FIG. 2. UNIVERSAL MILLER.

in one of these machines and then turned halfway around, showed lines opposite each other that coincided without visible error. An improved wedge adjustment and lock are provided for the dividing gear, as well as arrangements for quick withdrawal of the worm and shaft to permit the use of a direct dial for quick indexing, a clamp binder being provided for the spindle. The tailstock can be elevated and tilted, and the swivel vise especially calls for attention. It is provided with two clamping faces at right angles to one another, so that work can be held in the vise either vertically or horizontally, or may be set at any angle in either plane. Universal millers are now largely used in the surfacing and boring of jig holes, and here the micrometer adjustments, universal dividing head, universal power feeds, universal trips and universal vise come prominently into play. Sixteen spindle speeds are provided for. The arbors are held in place and removed by a screw rod passing through the hollow spindle. Drop forgings are used to the exclusion of cast iron for the smaller shaped pieces. Simplicity is secured by making one part perform several functions, wherever possible, which saves useless duplication and increases efficiency. Accessibility of all parts has not been overlooked, and any part can easily be removed without a general taking down of the machine. Illustrating this point, the change-gear box can be unbolted and taken out of the machine as a whole in a few minutes. Accompanying the machine is a three-tray tool-stand, mounted on three legs, with an iron drawer with suitable lock and key. Double friction countershaft accompanies the machine. Weight for domestic shipment, 2,800 pounds.

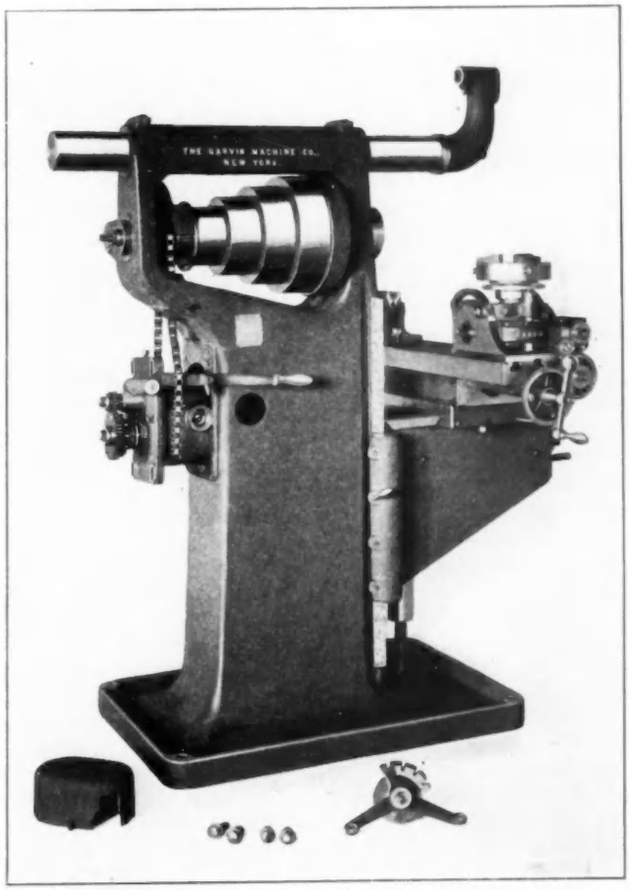


FIG. 3. UNIVERSAL MILLER. FEED GEAR BOX PARTIALLY REMOVED.

Letters from Practical Men

The Universal Milling Machine as Applied to Jig Making.

Editor American Machinist:

The writer has been occasionally asked what he should consider the most difficult piece of work to be found in machine practice, and his invariable answer was, to put a hole just where we wish it located. Now, this answer may appear ridiculous to some people, but if they will stop and think over their past experience, they will no doubt recall instances when they have laid out a certain point, measured over and over again, drawn a circle around the point, sharpened the drill very carefully, drilled apparently to split the line, but after completing the operation have found their drilling just enough out to make trouble. This was not poor workmanship; it was only poor methods. A drill of any sort is one of the most imperfect cutting tools in general use, and although drills are tools that cannot be

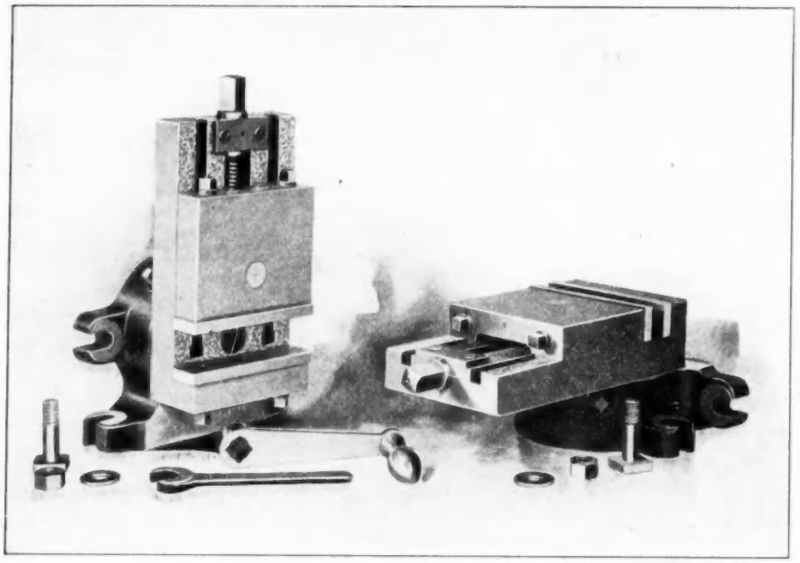


FIG. 4. VISE FOR UNIVERSAL MILLER.

dispensed with, yet they are so sensitive to the slightest imperfection of the material which they may cut that they are liable to float off in any direction, or wherever they may find a weak spot toward which they will invariably crowd. Jig making usually calls for more care in locating holes than the average of machine work. There are many good and sure ways of laying out and setting up for locating jig holes, and perhaps for plain surface work the indicator and face-plate hold the highest place with many mechanics. Some prefer a transfer plate of an accurately determined length, which, having been located at any convenient starting point, is then moved in a known direction and to just its known length, which would be the exact distance between centers desired. Others will index cross-feed screw on their lathes, and, having properly secured their jigs to the carriage, proceed to drill and lay off distances by this means. Now, all these methods, as well as others known to the writer, are good so far as obtaining an approximate measurement, or even practical accuracy, but, "mortal slow," if after getting the location nothing better than a drill should be used to make the hole, even if machine reamed without stirring anything, the chances are not one in a thousand that the hole will be properly located. It must be bored to insure a correct job. There are no doubt thousands of jigs made every year—some pretty good ones, too—where nothing but scale, dividers and center punch are used to lay out, the holes drilled to line, follow reamed, unground bushings forced in, and when completed they are all right and sufficiently good for the class of work they are intended to produce. These jigs are not very accurate, but probably as near as the method of making would warrant. The construction of jigs calls for a greater variety of positions and angulation than any other class of machine work; in fact, this industry may be very properly called an ever advancing and changing school of applied geometry. There are thousands of natural geometricians to be found working in machine shops who have never seen the inside of a text-book on the subject but who frequently work out intricate problems in angulation successfully and grind their tools to the most scientific and effective lines.

Of all the machines to be found in the modern toolroom the universal miller stands pre-eminent. This is the machine of applied geometry. The combinations and positions obtained by means of a first-class universal are almost endless. A jig body properly set up in a universal may be rotated, swung, twisted around, raised, lowered, moved laterally or crosswise, set to any angle, drilled, bored, reamed, faced, slotted, profiled, indexed and in some cases completely machined and ready for the bushings without changing the original setting. There is scarcely any problem in jig making, no matter how intricate, that cannot be worked out on a universal with the greatest ease, and positive distances, angles and arcs in every direction are only a matter of correctly reading the index plates or wheels. Take, for instance, the jig shown on page 155 of the February 7 number of your journal, by Mr. D. E. MacCarthy. Center the jig on line *D A B*, having added temporary hubs to the pattern for convenience in mounting on dividing head centers, it will be readily seen that top, bottom, insides, outsides and angular face may be positively surfaced, and all the bushing and other holes drilled with certain accuracy, the boring and reaming being done at the same setting, and all this in comparatively quick time. This particular jig is (as Mr. MacCarthy has stated) a common form of fixture, and does not show up the combinations possible to be obtained on the universal so well as might be set forth in a more

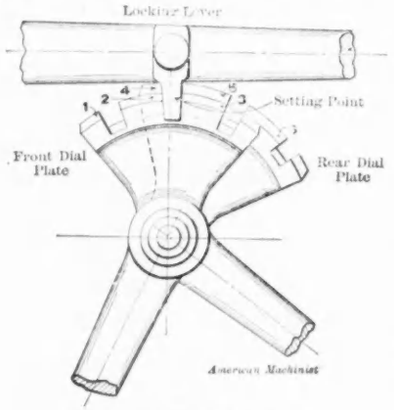


FIG. 5. FEED CHANGE LEVERS.

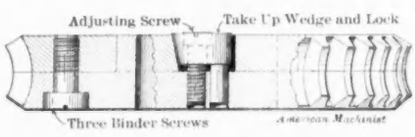


FIG. 8. SECTION THROUGH DIVIDING WHEEL.

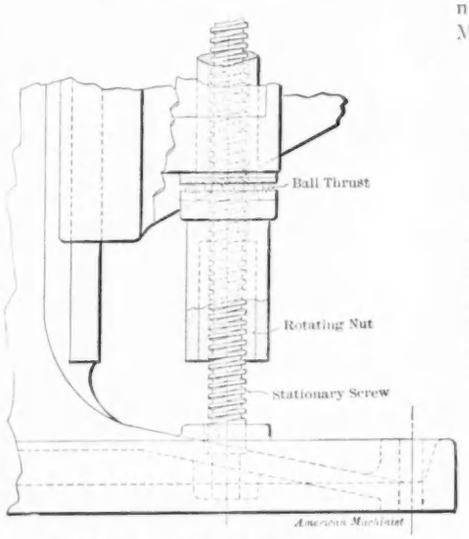


FIG. 6. ELEVATING SCREW AND NUT.

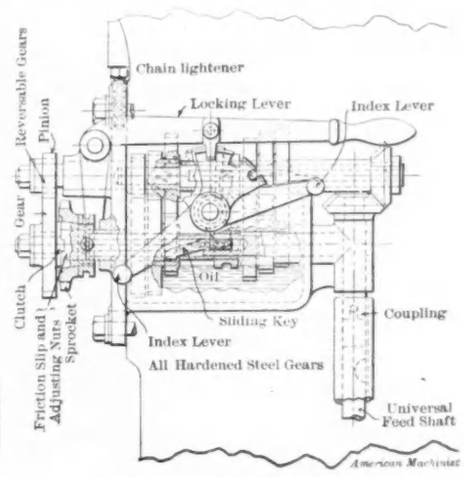


FIG. 7. FEED MECHANISM.

complicated or crooked piece of work. This is the machine for your natural geometrician. Give him one to run and a good drawing of your jig. He will "catch on" right away, and all the array of surface gages, dividers, scribers, face-plates, indicators, parallels and transfer plates will be laid aside, only to be brought out occasionally for some very crooked job. The writer has both designed and made many jigs and fixtures, some of them quite intricate and complex, with a moderate degree of success, and he is of the opinion that the great possibilities of the up-to-date universal miller as a valuable and labor-saving adjunct to the jig maker's outfit have been too much overlooked by the fraternity. Of course there is a wide range to the degrees of accuracy required in the various products by the interchangeable system, as, for instance, in comparing a watch movement and a mowing machine; but all must admit that the greater the precision of the tool by which the latter are produced the more economy in manufacture, and, the better everything lines up, the longer the life of the machine. This applies with equal pertinence to every machine industry. Occasionally we come across a phenomenal workman with hand and eye in such perfect training that we cannot but admire his wonderful skill, yet he is rarely to be found. Even supposing that such a man could outfile, chip and scrape his fellows, the up-to-date toolmaker with his thorough training in the use of the universal miller will surely outstrip the genius in quantity, equal him in quality, and all that with far less wear and tear on his nervous system. A good filer is always admired for his skill, but the file has passed the zenith of its usefulness as an instrument of precision. The milling machine has surely and properly superseded the file and other relics of the good old times of hand work, and it is going to stay right in front, increasing in usefulness and popularity (especially the universal) the more its great range of adaptability is known and utilized.

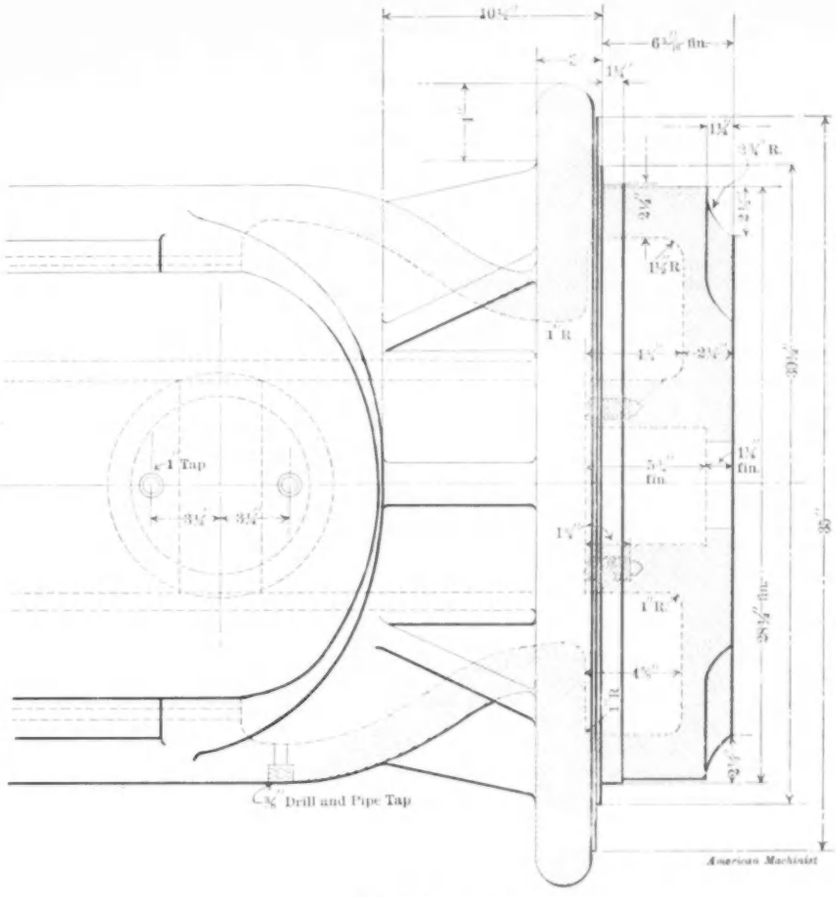
H. D. F.

Some Points in Drawing Room Practice.

Editor American Machinist:

In the letters recently published respecting drawing-room practice, I have seen no mention of a device which I have often found useful but have not seen in use in many of the drafting rooms in which I have worked. I refer to the ideal section. Briefly defined it is the same as the ordinary section, except that the hatching is done with dotted lines and thus it may be superposed on any outside view. Hence it is often useful to make clear to the patternmaker a small detail, as the shape of a core, which would otherwise necessitate a complete section and perhaps crowd the sheet. This is usually accomplished by breaking out a part of the outside view, but I think the ideal section often preferable. The enclosed sample will show the method clearly.

DRAFTSMAN.



THE "IDEAL" SECTION.

Editor American Machinist:

The presentation in your issue No. 13, by Mr. Wm. Pilton, of a sheet, "Drawing-Room Practice at the Pennsylvania State College," was made without the knowledge of the writer. The complimentary notice accorded this sheet by Mr. Pilton, under such circumstances, would seem to warrant interest in a more complete statement of the system, of which the above mentioned code of instructions forms a part.

The system is not elaborate, and red tape is carefully avoided. Machine design, as a process of engineering, is held to include all labor, mental or manual, from the original sketch to the filing of the finished tracing in its proper drawer. To this end, the student is made responsible for his time, which he specifically fills in on the time card; he is made to follow the analysis of a machine part to a complete finish in the detail drawing; he is forced to classify, title and index his work by the index cards, that he and others may find and refer to his work when desired.

The sheets and cards herewith shown are self-explanatory on their face. The filing system is nothing if not simple, and it is elaborate enough for the place, and therefore efficient. Drawing-room method is held to be as important for the student as it is for the draftsman and engineer, and the practice of it as necessary to give the instructor full control and knowledge of his students, as it is to the chief engineer, who is responsible for the designing and construction work of his many assistants.

Machine design is not merely the making of drawings. In its only true sense it is the *art of mechanical thinking*. Hence machine design, in a course in mechanical engineering, is nothing if not fundamental to engineering proficiency. To be thus fundamental the student must have something tangible to get hold of, some code or course of action to fall back upon, which he will instinctively follow, no matter how simple or complicated, plain or obscure the problem which confronts him may be. This course of action is as much a part of the general scheme of instruction as that already considered. In fact, it may really be said to be the basis of the system. Condensed to a brief code it is:

(1) Analyze all maximum and average forces which every machine member may receive.

(2) Theoretically, design to resist these forces.

(3) Practically, modify this design to

SYSTEM OF INDEXING AND FILING STUDENT DRAWINGS.
THE PENNA. STATE COLLEGE. FEB. 1, 1901.
DEPT. OF M.E.

THE STANDARD SIZE FOR DRAWINGS IS 18×24. ALWAYS USE THIS SIZE IF POSSIBLE.
IN SPECIAL CASES THE FOLLOWING SIZES ONLY MAY BE USED, A SPECIAL SYMBOL AS BELOW TO BE PLACED AFTER THE REGULAR FILING NO.-
9×12- SYMBOL- X
12×18- " - Y
24×36- " - Z

CYLINDER
FOR
12×36 CORLISS ENGINE
THE PENNA. STATE COLLEGE
DEPT. OF M.E.
SCALE 3"=1' FEB. 1, 1901.
C.B. Smith.
02A61

NOTATION AND INSTRUCTIONS.

THE SAMPLE FILING NO.-02A61- INDICATES; [02] THAT THE DRAWING WAS MADE BY A MEMBER OF THE CLASS OF '02; [A] THAT THE WORK WAS IN KINEMATICS, AS CLASSIFIED BELOW; [61] THAT THE DRAWING WAS THE 61ST CONSECUTIVE DRAWING IN KINEMATICS MADE BY THE CLASS OF '02. AS NO ADDITIONAL SYMBOL APPEARS, THE SIZE OF SHEET IS STANDARD, OR 18×24. OTHERWISE, A SPECIAL SIZE, SUCH AS 24×36 WOULD BE INDICATED THUS,- 02A61Z.
FILING NOS. SHOULD BE ENTERED CONSECUTIVELY BY THE STUDENT IN A BOOK PROVIDED FOR THE PURPOSE.
TWO DUPLICATE INDEX CARDS SHOULD BE FILLED OUT BY THE STUDENT AND HANDED IN WITH EACH DRAWING.
INDEX CARDS SHOULD BE FILED, ONE SET ACCORDING TO CLASS OF WORK, THE OTHER BY STUDENTS' NAMES.

CLASSIFICATION OF WORK.

KINEMATICS	A
STEAM ENGINES	B
PUMPING AND HYD. MACH.	C
AIR COMP. AND PNEUMATIC MACH.	D
MACH. OF TRANSMISSION	E
HOIST. AND TRANSPORTING MACH.	F
BOILERS	G
	H
	J

FIG. 1. COMPANION SHEET OF INSTRUCTIONS TO ACCOMPANY THE ONE GIVEN BY MR. PILTON IN ISSUE NO. 13.

The Pennsylvania State College. Time Card. Mechanical Engineering Dept.

NAME C.B. Smith

CLASS 1902 TERM 2 WEEK 3 & 4

DATE	HOURS	DESCRIPTION OF WORK
		20×12×18 Dup. St. Pump.
1/29	2	Detailing Steam Cyl.
2/1	2	" " "
2/5	4	Tracing " "
2/8	1	Calculating Piston Rod
TOTAL	9	

RELATIVE GRADE: 1st, Accuracy; 2nd, Finish and Completeness; 3rd, Rapidity

FIG. 2. STUDENT'S TIME CARD.

suit manufacturing and commercial requirements.

(4) Delineate or produce a working drawing which shall fully transfer specific instructions from the engineer to the workman.

In the fulfillment of the above the mechanical engineer attains his highest success. As his rough sketch, or even general lay-out to scale, is often found to be impracticable when subjected to a "working-out" by the draftsman, so any results by the student short of complete delineation leave unconsidered many constructive points invaluable to him as basis for future engineering practice. Machine design, then, fundamentally carried out in the college drawing room, enforces detailed and specific discussion, not only of forms and sizes, but of all shop departments and methods. It is this fundamental relation that makes the engineer of wise discretion and manifold intelligence. It is this sort of discussion that sends the student's mind on the round which future practice will lead it, through the pattern shop, smith shop and foundry, through the machine shop, toolroom and erecting department, through the offices of the superintendent, manager and salesman. After this round of investigation, the drawing of a small detail means more to the student than when he started it or after mere outline of it.

The keynote of all the above is method, *systematic* method and the development of mechanical habit. Within the short limit of a college course it is not desirable or possible to develop expert specialists in any line; neither is it possible to make general engineers. It is possible, however, to use a homely illustration, to furnish the ammunition, prime it and correctly set the sights, and then whether the young engineers behind the guns destroy navies or blow up their own ship depends on themselves alone. CHAS. L. GRIFFIN.

Pennsylvania State College.

[With this communication Mr. Griffin sends us some sample drawings made by his students, which we have no hesitation in saying are the best school drawings we have ever seen. They conform to shop standards, and would be considered first-class drawings anywhere.—Ed.]

Discarding the Use of the Foot as a Unit in Drawings.

Editor American Machinist:

In issue No. 13, in regard to drawing-room practice, "Deke" recommends the use of the 1-inch unit on work below 8 feet. I would like to second this idea and go a step further and suggest using a scale graduated for this way of working in the drafting room. The scale is very simple and has the advantage of being graduated so that a drawing can be scaled with the fraction end at any side of the drawing, so that you do not have to clear the board to take a measure should the instrument lay where the long end would come in the usual style of scale.

The sketch shows the graduations, and it will be noticed that there is only one size on each scale. Of course this means several scales; but it does away with hunting up the side you are using, which you have to do on most scales now in use.

Of course the dimensions can be changed to feet and inches on the drawing after laying out, if preferred, but I have used this system for several years and know

		Smith, C.B.			Steam Engine
02A	61	Steam Cylinder 12×36 Corliss Engine Jacketed, 150 lb. pres.	02A	61	Steam Cylinder 12×36 Corliss Engine Jacketed, 150 lb. pres.
Feb. 5/01			Feb. 5/01		C.B. Smith.

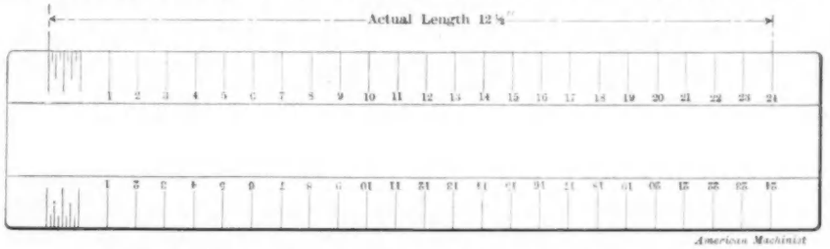
American Machinist

FIG. 3. FILING CARDS FOR STUDENTS' DRAWINGS.

of others who are using their scales the same way, and find it reduces the errors in the figures and the mental process as well.

This is suggested for machine tool and like work and of course would not be advisable for lines of work that go up into large dimensions and therefore must have their scales graduated to the foot in order to get their work on a standard sized drawing, but for any work that does not vary from ⅛, ¼, ½ and full size, it is all right and means four scales which will cover nearly all drawings in ordinary detailing for the shop.

It will be noticed that the sketch is half



American Machinist

A DRAFTSMAN'S SCALE DIVIDED INTO INCHES THROUGHOUT ITS LENGTH.

size and the actual length of graduations is 12½ inches.

This makes the total number of inches 25 for ½, 50 for ¼ and 100 for ⅛ size, which are easy to add when taking long measures. ERNEST J. LEES.

Franklin, Pa.

The Public Buildings Commission of Philadelphia insists that an air cushion shall be provided for the large elevator in the tower of the City Hall before it is allowed to be operated. The only received bid for the air cushion is $25,000. The plans contemplate the enclosing of the shaft with heavy steel plates and binders to a hight of 84 feet. The rebound of the carriage will be provided for by a partial escape of the air under the carriage.

Personal.

Robert L. Peck, formerly designer and draftsman for the Pratt & Whitney Company, has become associated with the New Britain Machine Company in a similar connection.

Herman J. Hilgendorf, who resigned a position as foreman with the Remington Arms Company about three and a half years ago, and has been in New York, has returned to that position.

W. S. Rogers, until recently manager of the Ball Bearing Company, of Boston, has associated himself with the Steamobile Company of America, at Keene, N. H., as vice-president and manager of the manufacturing department.

H. F. J. Porter, formerly manager of the Chicago office of the Bethlehem Steel Company, and more recently located at the works at South Bethlehem, has been appointed New York sales agent of the company, with headquarters at 100 Broadway.

Obituary.

Mrs. M. C. Hammett, in whose name was conducted the business of manufac-

(Continued on next page.)

Miscellaneous Wants.

Advertisements will be inserted under this head at 25 cents a line, each insertion. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Gear Wheels, gear cutting. Grant ; see p. 24.

Caliper cat. free. E. G. Smith, Columbia, Pa.

Punches & dies. Wal.M.Wks., Waltham, Mass.

Forming lathes. Mer.Mach.T.Co., Meriden, Ct.

For Sale—One 2½ H. P. gas or gasoline engine for $65. Box 1171, Springfield, Mass.

Light and fine mach'y to order ; models and elec. work specialty. E. O. Chase, Newark, N. J.

Book "Dies and Diemaking," $1, post paid. J.L.Lucas, Bridgeport, Ct. Send for index sheet.

F. J. Stokes Machine Co., 13th and Noble sts., Philadelphia, Pa., build light machinery.

Selden Packing for Stuffing box, with or without rubber core. Randolph Brandt, 38 Cortlandt st., New York.

Modern machine shop wants specialty to manufacture as side line. Address F. G. S., care AMERICAN MACHINIST.

We do all kinds of light experimental model and special machine work ; fair prices ; satisfaction guaranteed. The Alcorn Machine Co., Waltham, Mass.

Institutions retiring from business having machine tools, brass and wood working machinery will find it to their interest to correspond with us. We purchase complete plants or handle them on com. C. C. Wormer Mach. Co., 55-59 Woodbridge st., W., Detroit, Mich.

Wanted—To correspond with parties wishing to take up the manufacture of successful automatic steam engine, protected by valuable patents and already well and favorably known on the market ; complete drawings and patterns for engines from 20 to 500 horse-power on hand ; immediate trade assured. Address "Engineer," care AMERICAN MACHINIST.

Wants.

Situation and Help Advertisements only inserted under this head. Rate 25 cents a line for each insertion. About six words make a line. No advertisements under two lines accepted, and no advertisements abbreviated. The cash and copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded. Applicants may specify names to which their replies are not to be forwarded ; but replies will not be returned. If not forwarded they will be destroyed without notice. Original letters of recommendation or other papers of value should not be inclosed to unknown correspondents.

Situations Wanted.

Mechanical draftsman wishes position. Address Box 124, AMERICAN MACHINIST.

Die and tool maker, quick and correct worker, desires position. Address J. U., Box 178, Riverside, N. J.

Blacksmith, a first-class tool dresser, desires change within New England. Box 72, AMERICAN MACHINIST.

Mechanical draftsman and designer wishes position ; New England or Eastern New York preferred. Address Box 107, AMER. MACH.

Wanted—Responsible positions for competent men of mechanical experience. Address James Brady, 220 Broadway, New York.

Wanted—Position as drop hammer die sinker ; 6 years' practical experience. Address F. H. MaGill, 367 Jeff ave., Rochester, N. Y.

Having left my former position, I should like to hear from parties wishing a competent iron foundry superintendent or foreman. Box 416, AMERICAN MACHINIST.

Young man, 20, with 3 years' experience in machine shop, desires position in machine shop or toolroom ; not particular about wages. Box 122, AMERICAN MACHINIST.

Mechanical engineer, practical mechanic of long experience, desires a position as superintendent with a reliable manufacturing company. Address Box 69, AMER. MACHINIST.

Mechanical engineer, a practical mechanic, experienced in organizing and superintending manufactures, is open for position ; first-class references. Address Box 123, AM. MACH.

Wanted—By a Cornell student, senior, a position with an engine-building company ; will work for small salary if chance for advancement is offered ; good references. Box 117, AMERICAN MACHINIST.

Designing draftsman, in charge for past 5

(Continued on next page.)

(*Continued from preceding page.*)

turing the Richardson balanced valve for locomotives, died at Troy, N. Y., May 7. The shop was originally the experimental shop of George W. Richardson and in it the pop safety valve, the balanced slide valve and other inventions were perfected and manufactured. Upon the consolidation of the safety-valve business with that of the Ashcroft Company the shop was run by Mr. Richardson's son, F. W. Richardson, and upon his death the control of the business passed to his widow, who married M. C. Hammett a year later.

Inquiry for Machinery.

(151) Wanted, names and addresses of manufacturers of machines for producing a uniform twist in steel bars of about 1½x5-16 inch and 1¼x5-16 inch elliptical section and rectangular section; in other words, machines for twisting coal augers or drills.

We notice in a contemporary an editorial entitled "The Usefulness of Power." It might have been a timely topic a hundred years ago.

Manufacturers.

The Ideal (flouring) Mill, at Minnesota City, Minn., will be enlarged.

The pasteboard mill of the E. H. Davey Company, Bloomfield, N. J., will be rebuilt.

The United States Radiator Company, Dunkirk, N. Y., is doubling the capacity of its plant.

It is said that a new building will be erected for the Upton Machine Company, at Beverly, Mass.

The Illinois Central Railroad has arranged to build a 1,500,000-bushel grain elevator at New Orleans.

Work has started on an addition to the main shop of the Card Electric Company, Mansfield, O.

The plant of the Seymour (Wis.) Woodenware Company, recently destroyed by fire, will be rebuilt.

An addition is being built to the plant of the Harrisburg (Pa.) Manufacturing & Boiler Company.

The Matawan Steel & Iron Company is a concern which is preparing to build a factory at Matawan, N. J.

The Western Electric Company opened new offices and salesrooms at 933 Market street, Philadelphia, May 8.

Drawings are under way for a factory building for Archibald Holmes & Son, carpet manufacturers, Philadelphia, Pa.

The Coronet Worsted Company, of Oakland, R. I. (Joseph E. Fletcher, agent and manager) will build a new mill.

An addition, 67x100 feet, three stories, will be built to the plant of the Crown Cork & Seal Company, of Baltimore City, Md.

The Wilmington (Del.) shops of the Pullman Palace Car Company, which are used for repair work, will be doubled in size.

Ground has been broken at Portsmouth, N. H., for a $500,000 electric plant for the Rockingham Light & Power Company.

Sheaff & Jaastad, engineers at 85 Water

(*Continued on next page.*)

Situations Wanted—Cont'd.

years, thoroughly experienced on machine tools, hoisting and dredging machinery, with some 9 years' shop experience, will be open for position shortly. Box 125, AM. MACH.

Position of responsibility by an all-round machinist and toolmaker, experienced on engine, electrical machine tools, instruments and automatic machinery; good systematic and executive ability in handling men and getting out work. Box 121, AMER. MACHINIST.

Position as superintendent of machine shop; up in modern shop practice, with experience of 30 years in the improving of machinery; employed last by one of the largest firms in the country; can furnish A1 references as to ability and general good character. Address S. E. H., care AMER. MACH.

Superintendent, at present in charge of several hundred men on engines, pumps, etc., would like to correspond with parties contemplating the erection or remodeling of a large machine plant, where the services of an able man are required to bring the product up to the American standard in quality and quantity; will contract from 1 to 3 years; no objection to locating in a foreign country. Address Box 96, AMERICAN MACHINIST.

Mechanical engineer and naval architect, having large experience in designing and constructing steam engines, steamships, sea-going hydraulic dredges, centrifugal and other pumps for all purposes, water works, etc., desires to change position as constructing engineer and chief for drawing office; advertiser talks English, German, Russian, French and Scandinavian languages. Box 116, A. M.

Help Wanted.

Wanted—First-class pump shop foreman. Box 115, AMERICAN MACHINIST.

Wanted—First-class toolmakers and machinists; steady employment and good wages. Box 93, AMERICAN MACHINIST.

Wanted—Chemist; one able to do all necessary work in an iron and brass foundry, melting 50 tons per day. Address Box 55, A. M.

Wanted—Some first-class, all-round machinists or toolmakers for fine experimental work. Apply at 529 West 22d st., Construction Dept., American Tobacco Co.

Wanted—Foreman for machine shop building slide valve and automatic engines and employing 40 to 50 machinists. Address L. R. R., care AMERICAN MACHINIST.

Wanted—Machinists and machine hands willing to work ten hours; state age, experience, wages expected and give references. Address Buffalo (N. Y.) P. O. Box 733.

Wanted—Foreman, familiar with modern practices, for brass foundry employing 6 to 8 men; state age, experience and references. The Goulds Mfg. Co., Seneca Falls, N. Y.

Experienced draftsman wanted; one familiar with hoisting machinery preferred; state salary, experience and where last employed. Address "Philadelphia," care A. M.

We invite application for machinists and molders; give references, experience and wages to start; work on steam engines and air compressors. Franklin Air Compressor Co., Franklin, Pa.

Wanted—Foreman for boiler shop; must be competent, reliable, energetic and familiar with latest methods of construction; state experience; give references. Address L. R. R., care AMERICAN MACHINIST.

Wanted—Competent designer, experienced on machine tool and jig work; state age, length of experience, with what firms previously employed and wages expected. The Bickford Drill & Tool Co., Cincinnati, O.

Machinists and vise men who can work to drawing on small interchangeable work; state length of experience and with what firm previously employed; none but good men need apply. Box 114, AMER. MACH.

Wanted—Superintendent, first-class man, to take charge of operating departments of a large modern stove foundry; exceptional opportunity, and salary commensurate with worth. "Davidson," care AMER. MACHINIST.

Draftsman wanted; one experienced in drawings for steam engines and general machinery; give age, experience and salary expected; a good, steady position in a small shop to the right man. Box 120, AM. MACH.

We are enlarging our works, and will shortly require an increased number of skilled mechanics; we invite application from pattern makers, molders and machinists. Address the Westinghouse Machine Company, East Pittsburgh, Pa.

Wanted—Wood pattern maker; must be first-class man, thoroughly capable to take charge of pattern department of large manufacturing concern; location Chicago, Ill.; give references and experience. Box 113, AMERICAN MACHINIST.

Salesman wanted who thoroughly understands filter press business; only those having a thorough knowledge of the trade in the East need apply; excellent position and good salary for the right man. Address "Liberty," care AMERICAN MACHINIST.

Wanted—Young man, capable of taking charge of foundry employing 50 men on wood-working machinery castings; must be thoroughly up to date and familiar with the latest and best methods. Address S. B. H., care AMERICAN MACHINIST.

Draftsman wanted; one experienced in designing machine tools preferred; applicants with less than 10 years' experience will not be considered; give full outline of experience; steady employment to right man; location New England. Box 95, AMER. MACHINIST.

Wanted—Five boilermakers in a non-union shop located in a Southern city of 20,000 inhabitants; healthy location; wages from $2.75 to $3; steady work and good treatment guaranteed; a shop where 140 men are employed. Box 118, AMERICAN MACHINIST.

First-class, experienced mechanical draftsmen wanted at once; some of them acquainted with electrical work; those with shop experience preferred. Apply, by letter, to Chief Draftsman, P. O. Box 911, Pittsburgh, Pa., stating experience in full and giving references.

Wanted—A first-class patternmaker, to work at the bench and have general supervision over pattern shop; healthy location in a Southern city of 20,000 inhabitants; a shop where 140 men are employed; good wages and good treatment guaranteed; steady job for the right man. Box 112, AM. MACH.

Wanted—Foreman for blacksmith shop where 3 or 4 blacksmiths work; foreman would be expected to work at the anvil and have general supervision; it is a non-union shop where 140 men are employed, in a Southern city of 20,000 inhabitants; healthy location; good wages, steady job and good treatment guaranteed to the right man. Box 119, AMERICAN MACHINIST.

Draftsmen Wanted.

We have positions open for capable, experienced Mechanical Draftsmen. Our business is to assist Draftsmen and Engineers (technical men only) to secure positions when unemployed, and to better their positions when employed. Our business was established in 1893.

No registration fee.

THE ENGINEERING AGENCY,
1605 Monadnock Block, CHICAGO.

WANTED—MANAGER

For plant manufacturing machine screws and light mechanical specialties; must be fully experienced in mechanical end of the business and have financial backing sufficient to become financially interested in the company; plant is modern, well located and is now doing good business. Address M. S. P., care AMERICAN MACHINIST.

Wanted Position as Manager

or other position of trust, in a firm of Marine Engineers and Boiler Makers, by gentleman at present Assistant Manager in a leading firm in Great Britain.

He has taken the degree of B. Sc., in England, is an expert designer, and is thoroughly practical, having 10 years' experience in shops and offices. He received his training on the Clyde, and has had experience of Government cruisers, torpedo boats, steam yachts, and highest class passenger and cargo steamers. Apply Box 54, AMERICAN MACHINIST.

WANTED

To correspond with parties wishing to take up the manufacture of successful automatic steam engine, protected by valuable patents and already well and favorably known on the market; complete drawings and patterns for engines from 20 to 500 horse-power on hand; immediate trade assured. Address "Engineer," care AMERICAN MACHINIST.

NOTICE Mr. Gus. C. Henning, New York, announces that the contract between himself and Messrs. Riehle Bros. Testing Machine Company, of Philadelphia, for the sale of the **Henning Pocket Recorder** is cancelled, and that the said Company has no longer the right to sell the apparatus. Anyone purchasing the apparatus from the above Company will be liable to a suit for damages for infringement of patent rights.

WANTED

by manufacturer in Germany machines of latest pattern for cutting and pointing lag screws with square and hexagon heads. Address Catalogue with full description and price to

Box 111
AMERICAN MACHINIST.

VALUABLE BOOKS.

Mechanical Movements, Powers, Devices and Appliances,
By Gardner D. Hiscox. **Price, $3.00**
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By Parsell & Weed. **Price, $2.50**
Liquid Air and the Liquefaction of Gases,
By Prof. T. O'Conor Sloane. **Price, $2.50**
Gas, Gasoline and Oil Engines,
By Gardner D. Hiscox. **Price, $2.50**
Complete Electrical Library (5 volumes),
By Prof. T. O'Conor Sloane. **Price, $5.00**
Linear Perspective Self-Taught,
By H. T. C. Kraus, C. E. **Price, $2.50**
Inventor's Manual, How to Make a Patent Pay,
New, revised and enlarged edition. **Price, $1 00**
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By Robt. Grimshaw. **Price, $1.00**
Compressed Air and its Applications, (shortly).

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NORMAN W. HENLEY & CO.,
PUBLISHERS,
15 Beekman St., NEW YORK.

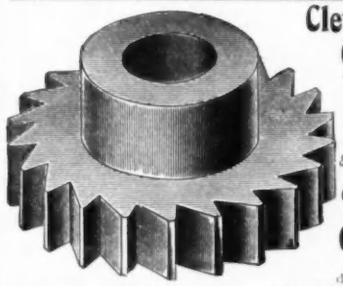
First-class modern FOUNDRY PLANT to Lease for a term of years. Equipment and a well established business for sale.

Superior fireproof building about 265 feet by 60 feet, with ample grounds and complete modern equipment nearly as good as new. Increasing demands in other manufacturing lines require the proprietors' attention.

Located in a progressive city about 300 miles east of Chicago, in a thriving manufacturing center with unsurpassed shipping facilities.

Parties interested in manufacturing hot water or steam heating boilers and furnaces, radiators, or general foundry work of any description, will find this a most favorable opportunity.

Good will of present business will more than pay expenses of operating the plant. Address Box 110, AM. MACHINIST.



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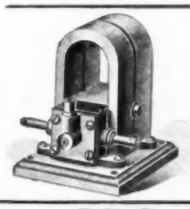
GEARS of all descriptions.



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Will Spark the Hardest Engine At All Times.
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Pronounced by steam users throughout the world the best joint packing manufactured. Expensive? Not at all, as it weighs 30% less than many other packings, consequently is much cheaper.

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62 Watling St., Queen Victoria St., London, E. C.

Steam-Boiler Economy. A Treatise on the Theory and Practice of Fuel Economy in the Operation of Steam-Boilers. By William Kent, A.M., M.E. 8vo. xiv + 458 pages; 126 illustrations. Cloth, **$4.00.**
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Tool Steel Balls.

We have the largest and best equipped plant in the world devoted to the manufacture of hardened and polished tool steel balls. The steel used is made expressly for us and is the result of a long and exhaustive series of experiments which has resulted in producing a uniformity of hardness, toughness and wearing qualities never before attained. Our regular stock line consists of tool steel balls in sizes from 1-16 in. to 4 in. in diameter as listed. We can grind balls to any of the intermediate sizes at special prices, which will be promptly quoted upon application. Can also furnish balls in Bessemer steel, brass, bell metal, etc.

Automobile and Cycle Parts Company, Cleveland Ohio.
CLEVELAND BALL AND PEDAL FACTORY.

(Continued from preceding page.)

street, Boston, have prepared plans for a large power-house at Cambridge, Mass.

William C. Peterson, Omaha, Neb., represents interests which propose to put up a beet sugar plant at South Sioux City, Neb.

The Kenyon Foundry, at Steubenville, O., has been purchased by Samuel Irwin, who will enlarge the foundry, add a boiler plant, etc.

The lumber mill near Ashland, Me., of the Ashland Manufacturing Company, of Bangor, has been burned, but will quite likely be rebuilt.

The building occupied by Asa Snyder & Co., Richmond, Va., architectural ironworks, brass foundry and machine shops, has been gutted by fire.

The plant at Chattanooga, Tenn., of M. A. Hunt & Co., Cincinnati, O., manufacturers of wire mattresses, has been burned, but will be rebuilt.

The Union Light, Heat & Power Company, Cincinnati, O., has been granted a permit to build an addition to its power-house on Madison avenue.

The plant of the Jackson & Sharp Company, car and ship builders, Wilmington, Del., is soon to undergo a number of improvements.

Fire, May 7, destroyed the buildings and contents of the Fifield Tool Company's plant at Lowell, Mass., entailing loss estimated at some $200,000.

The S. M. York Machinery Company, Cleveland, O., has announced that after May 15 its office and warerooms would be at 263-265 St. Clair street.

The contract for a factory for Underhill & Sisman has been let to G. T. Browning, Aurora, Ont. The plans call for a boiler-house, 30x40 feet.

W. H. Burns, underwear manufacturer, Worcester, Mass., will erect an additional factory building. An electric light plant will be installed in it.

Robt. Wetherill & Co., manufacturers of Corliss engines, boilers, etc., Chester, Pa., will erect a 100x240-foot addition to be used as a machine shop.

J. R. Tubb, Sparta, Tenn., will probably form a stock company capitalized at $50,000 to manufacture wagons. He is already running a spoke factory.

A building permit has been issued for a three-story addition to the factory of the Victor Safe & Lock Company, Cincinnati, O., at a cost of $10,000.

T. L. Myers, of the Art Tile Manufacturing company, of Los Angeles, Cal., and Prof. Joseph Kirkham contemplate building an art tile factory at Corona.

The L. Schreiber & Sons Company, Cincinnati, O., has purchased 18 or 20 acres at Norwood, and will build a large structural and architectural plant.

The plant of Timothy Murphy, machinist, at Jacksonville, Fla., has been destroyed by fire. He is in the market for machine-shop and foundry equipment.

The American Steel Foundry Company, of St. Louis, Mo., will, it is understood, make an addition to its plant in Granite City, Ill., to cost probably $100,000.

An outlay of $10,000 for improvements at the Union Iron Works, Decatur, Ill., is to be made. A new foundry and wood-working department are to be erected.

The Buffalo (N. Y.) Steam Pump Company will double the capacity of its works at North Tonawanda. It has a large number of orders on hand and many in sight.

A 50x344-foot addition will be built to the stock house at the plant of the Geo. V. Cresson Company, Philadelphia, manufacturer of power-transmitting machinery.

A building permit has been issued at Cincinnati, O., for a three-story factory to be erected by Mrs. Margaret Darusmont, for the Cincinnati Stamping Company.

The New Brighton (Pa.) Steel Company, manufacturer of tool steel, will soon add a 12-inch bar mill and a 1,200-pound double-leg steam hammer and make other improvements.

The National Rotary Valve Gas Engine Company, 26 North Canal street, Dayton, O., will add a few machine tools and will want a milling machine and a lathe of about 10 or 12 inches swing.

The Church Automobile & Specialty Company, whose president is W. A. Church, of Pittsburgh, Pa., has been considering New Castle, Pa., and Youngstown, O., with a view to locating a plant.

A fire occurred recently in the works of the Stover Manufacturing Company, Freeport, Ill., but the factory in the main was saved and was expected to be running again in all departments before this time.

A building will be erected for Thomas Armstrong at Detroit, Mich., to be occupied by the Morgan & Whately Company, manufacturer of ladies' wrappers, etc. A dynamo will be installed to drive the machines.

Fire has destroyed the plant of the Consolidated Chemical Company at East Kane, Pa. The building is understood to have contained machinery for the manufacture of wood alcohol and other products of wood.

A $700,000 beet sugar factory is to be built at Greeley, Colo. At the head of it is Clarence A. Granger, who is in charge of the erection of a beet sugar factory at Logan, Utah, under E. H. Dyer & Co., Cleveland, O.

The Webster, Camp & Lane Machine Company, Akron, O., manufacturer of engines, boilers and mill machinery, has increased its capital stock to $300,000. A new plant will be built at South Akron in the near future.

The Zenith Portland Cement Company, Detroit, Mich., is constructing a plant at Grass Lake. The officers are as follows: President, E. T. Allen; vice-president, R. H. Evans; secretary, Frank A. Vernor; treasurer, George Johnson.

The United States Standard Scale Company, manufacturer of automatic weighing machines, at present located in Granite street, Quincy, Mass., has purchased a site for a new factory and will erect a $10,000 brick building.

Only a few weeks ago the Shugers Bros., Coldwater, Mich., equipped their factory with machinery to manufacture small gasoline engines, and they already find themselves so flooded with work that they will have to build an addition.

Dr. T. C. Wheaton will build, at Millville, N. J., at window glass plant, 100x140 feet, operated by gas, lighted electrically, and heated by steam. There will be thirty blowing tanks. The packing boxes used will be made by machinery.

The Sleepy Eye (Minn.) Milling Company proposes to erect a new mill with a daily capacity of 3,500 barrels, also a building for a storage elevator to hold a quarter million bushels of wheat. It will expend $150,000 in such improvements.

The M. S. Benedict Manufacturing Company, in East Syracuse, N. Y., has had plans prepared for a spoon factory. It is also said to be the intention to move the plant of the

(Continued on next page.)

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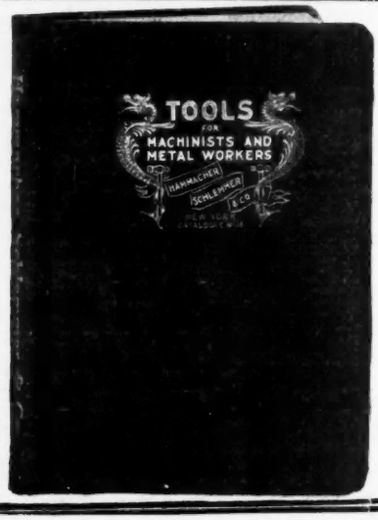

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Machinists and Metal Workers.

We have just published our new catalog—devoted exclusively to this line—nearly 300 pages of illustrations, sizes, data and detail of all kinds, of greatest interest to the man who buys tools. We deal only with consumers direct, not through the trade.

Ask for Catalog 115A.

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209 Bowery, NEW YORK, since 1848.

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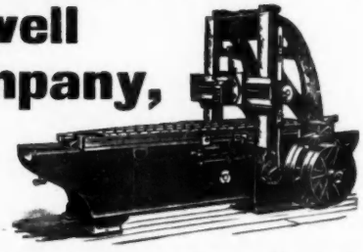

U. Baird Machinery Co., Pittsburgh, Pa.
Parke & Lacy Co., San Francisco, Cal.
Robinson & Carey Co., St. Paul, Minn.
Manning, Maxwell & Moore, Chicago, Ill.
Manning, Maxwell & Moore, New York City.

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With Patent Spiral Flutes. Arbors, Mandrels, Taps, Dies, Screw Plates, Tap Wrenches, Bolt Cutters, Drilling Machines, Etc.

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